State: Bihar

Agriculture Contingency Plan for District: Vaishali (2021-22)

1.0 2.0	**District Agriculture profile**			
1.1	**Agro-Climate/Ecological Zone**			
	Agro-Ecological Sub Region (ICAR)	Eastern Plain, Hot Sub Humid (mist) Eco-Region (13.1)		
	Agro-Climate Zone (Planning Commission)	Middle Gangetic Plain Region (IV)		
	Agro Climate Zone (NARP)	North West Alluvial Plain Zone (BI-1)		
	List all the districts or part there of falling under the NARP Zone	Zone 1 (Vaishali, Saran, Sivan, E. Chasmparan, Gopalganj, W. Champaran, Sitamarhi, Seohar, Muzaffarpur,Darbanga, Madhubani and Samstipur)		
	Geographic coordinates of district headquarters	**Latitude**	**Longitude**	**Altitude**
		25^0 41' – 26^0.13' N	$85^0$13'- $86^0$21' E	60m
	Name and address of the concerned ZRS/ZARS/RARS/RRS/RRTTS	Zonal Research Station (ZRS), Dholi, Muzaffarpur		
	Mention the KVK located in the district	KVK, Hariharpur (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):	1107	45	24^{th} meteo. Week (11 – 17 June)	41^{th} meteo. Week (8- 14 October)
	NE Monsoon(Oct-Dec):	19.3	03		
	Winter (Jan- March)	29.6	03	-	-
	Summer (Apr-May)	78.2	04	-	-
	Annual	1234.1	55	-	-

	January	February	March	April	May	June	July	August	Septem-ber	October	Novem-ber	Decem-ber
Avg. Temperature °C (°F)	16.3 °C (61.3) °F	19.9 °C (67.8) °F	25.5 °C (77.9) °F	30.2 °C (86.3) °F	30.9 °C (87.7) °F	30.3 °C (86.6) °F	28.5 °C (83.3) °F	28.4 °C (83.1) °F	27.7 °C (81.8) °F	25.7 °C (78.3) °F	22.1 °C (71.8) °F	18 °C (64.4) °F
Min. Temperature °C (°F)	10.6 °C (51.1) °F	13.6 °C (56.4) °F	18.4 °C (65.1) °F	23.2 °C (73.8) °F	25.3 °C (77.5) °F	26.3 °C (79.3) °F	26 °C (78.8) °F	25.9 °C (78.6) °F	25 °C (76.9) °F	21.6 °C (70.8) °F	16.4 °C (61.6) °F	12.3 °C (54.1) °F
Max. Temperature °C (°F)	22.2 °C (72) °F	26.2 °C (79.2) °F	32.4 °C (90.3) °F	36.9 °C (98.5) °F	36.6 °C (97.9) °F	34.8 °C (94.6) °F	31.8 °C (89.2) °F	31.7 °C (89.1) °F	31.1 °C (87.9) °F	30.1 °C (86.2) °F	27.9 °C (82.2) °F	24 °C (75.2) °F
Precipitation / Rainfall mm (in)	16 (0.6)	16 (0.6)	14 (0.6)	17 (0.7)	55 (2.2)	191 (7.5)	365 (14.4)	295 (11.6)	232 (9.1)	59 (2.3)	4 (0.2)	7 (0.3)
Humidity(%)	68%	59%	41%	37%	53%	69%	82%	83%	84%	76%	64%	66%
Rainy days (d)	2	2	2	2	6	12	20	20	16	5	0	1

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)	2, 01.870 hac.	150.177	Negligible	29.304	0.362	5.45	4.512	1.977	10.00	-

Source:- District Development Plan, Vaishali (2019-20)

1.4	Major Soils	Area (‘000 ha)	Percent (%) of total
	1**Calcareous** - Fine sandy loam leveled land with 0-3% slope, fertile deficient in zinc, Boron.	NA	NA
	2. Non Calcareous - Coarse sandy loam leveled with 0-3% slope, fertile deficient in zinc.	NA	NA
	Others (specify):		
	1**Calcareous** - Fine sandy loam leveled land with 0-3% slope, fertile deficient in zinc, Boron.	NA	NA
	2. Non Calcareous - Coarse sandy loam leveled with 0-3% slope, fertile deficient in zinc.	NA	NA

1.5	Agricultural land use	Area (‘000 ha)	Cropping intensity %
	Net sown area	150.177	161.19%
	Area sown more than once	52.682	
	Gross cropped area	202.859	

1.6	Irrigation	Area (‘000 ha)		
	Net irrigated area	39.855	Net irrigated area	
	Gross irrigated area	52.682	Gross irrigated area	
	Rainfed area	57.640	Rainfed area	
	Source of Irrigation	**Number**	**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 (please specify)		5738	

	Total Irrigated Area		52682	34.57
	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 2019-20)

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			**Rabi**				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Paddy		62260	**62260**					**62260**
	Maize (Kharif)	17702		**17702**					**17702**
	Pigeon pea		3526	**3526**					**3526**
	Wheat				49969		**49969**		**49969**
	Maize (Rabi)				13639		**13639**		**13639**
	Til							51	**51**
	Urad							560	**560**
	Rai & Mustard					3971	**3971**		**3971**

Source: District Development Plan, District Agriculture Office, Vaishali (2019-20)

	Horticulture crops- Fruits	**Area ('100 ha)**		
		Total	**Irrigated**	**Rainfed**
	Mango	**8089**		**8089**

	Litchi	**3468**		**3468**
	Banana	**2898**		**2898**
	Guava	**1226**		**1226**
	Lemon	**566**		**566**
	Horticulture crops-	**Total**	**Irrigated**	**Rainfed**
	Vegetables			
	Potato	**13500**	**13500**	**Potato**
	Cauliflower	**4611**	**4611**	**Cauliflower**
	Tomato	**3783**	**3783**	**Tomato**
	Onion	**1621**	**1621**	**Onion**
	Cabbage	**2347**	**2347**	**Cabbage**
	Okra	**3483**	**3483**	**Okra**
	Potato	**13500**	**13500**	**Potato**
	Cauliflower	**4611**	**4611**	**Cauliflower**
	Tomato	**3783**	**3783**	**Tomato**
	Onion	**1621**	**1621**	
	Cabbage	**2347**	**2347**	
	Okra	**3483**	**3483**	
	Medicinal and Aromatic crops	**Total**	**Irrigated**	**Rainfed**
	Plantation crops	**Total**	**Irrigated**	**Rainfed**
		0	**0**	**0**
	Fodder crops	**Total**	**Irrigated**	**Rainfed**

Source- DAO, Vaishali

1.8	Livestock	Male (‘000)	Female (‘000)	Total (‘000)
	Non descriptive Cattle (local low yielding)			67216
	Improved cattle			
	Crossbred cattle			
	Non descriptive Buffaloes (local low yielding)			91415
	Descript Buffaloes			
	Goat			171200
	Sheep			
	Others (Camel, Pig, Yak etc.)			
	Commercial dairy farms (Number)			

1.9	Poultry	No. of farms	Total No. of birds (‘000)
	Commercial		63284
	Backyard		
1.10	**Fisheries**		
	0	**122**	**0**

	A. Capture	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**		**No. of Reservoirs**		**No. of village tanks**	

	B. Culture			
		Water Spread Area (ha)	Yield (t/ha)	Production (‘000 tons)
	i) Brackish water			
	ii) Fresh water (Data Source: Fisheries Department)			

Source: -District development programme, District Animal Husbandry & Fishery Officer, Vaishali (2019-20)

1.11 Production and Productivity of major crops (Average of last 5 years: 2015-20)

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	150.7	1567					150.7	1567	
	Maize	19.7	1650	95.4	6400			115.1	3950	
	Wheat			162.2	2860			162.1	2100	
	Pulses					6.3	0.7	6.3	0.7	
	Oil Seeds							5.4	1150	
Major Horticulture crops (Crops identified based on total acreage)								**Production (000 t)**		
	Litchi							55.8		
	Mango							93.7		
	Guava							12.5		
	Banana							201.6		
	Lemon							4.7		
	Papaya/Aonla etc.							12.3		

1.12	Sowing window for 5 major field crops	Rice	Pigeonpea	Wheat	Maize	Lentil

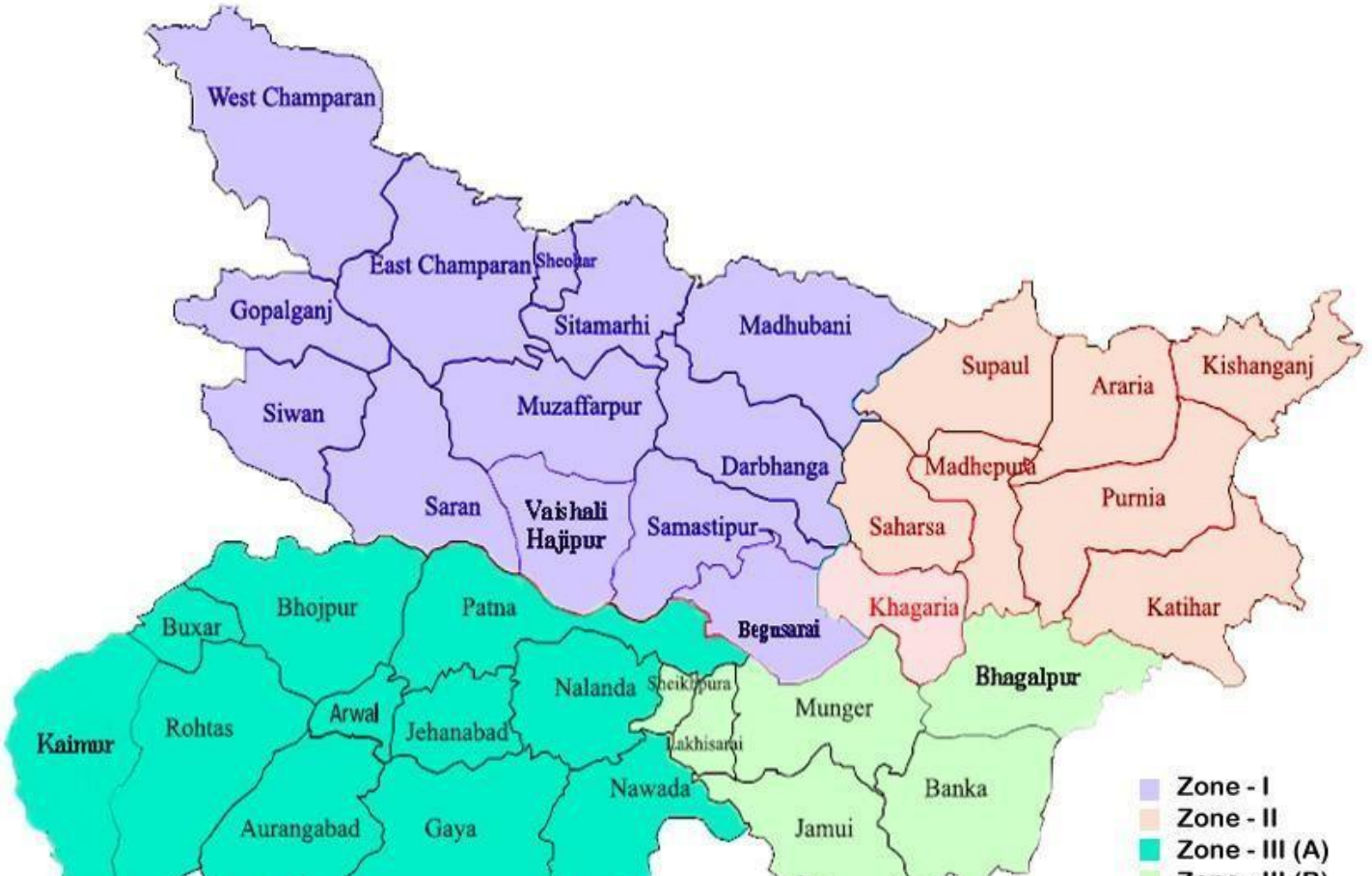
	(start and end of normal sowing period)					
	Kharif-Rainfed	2nd week of June	3rd week of June 2nd week of July	-	3rd week of May 2nd week of June	-
	Kharif-Irrigated	2nd week of June 3rd week of June	-	-	-	
	Rabi-Rainfed	-	-	4th week of October 1st week of November	-	2nd week of October 1st week of November
	Rabi-Irrigated	-	-	2nd week of November 2nd week of December	2nd week of October 3rd week of November	2nd week of October 2nd 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	√		

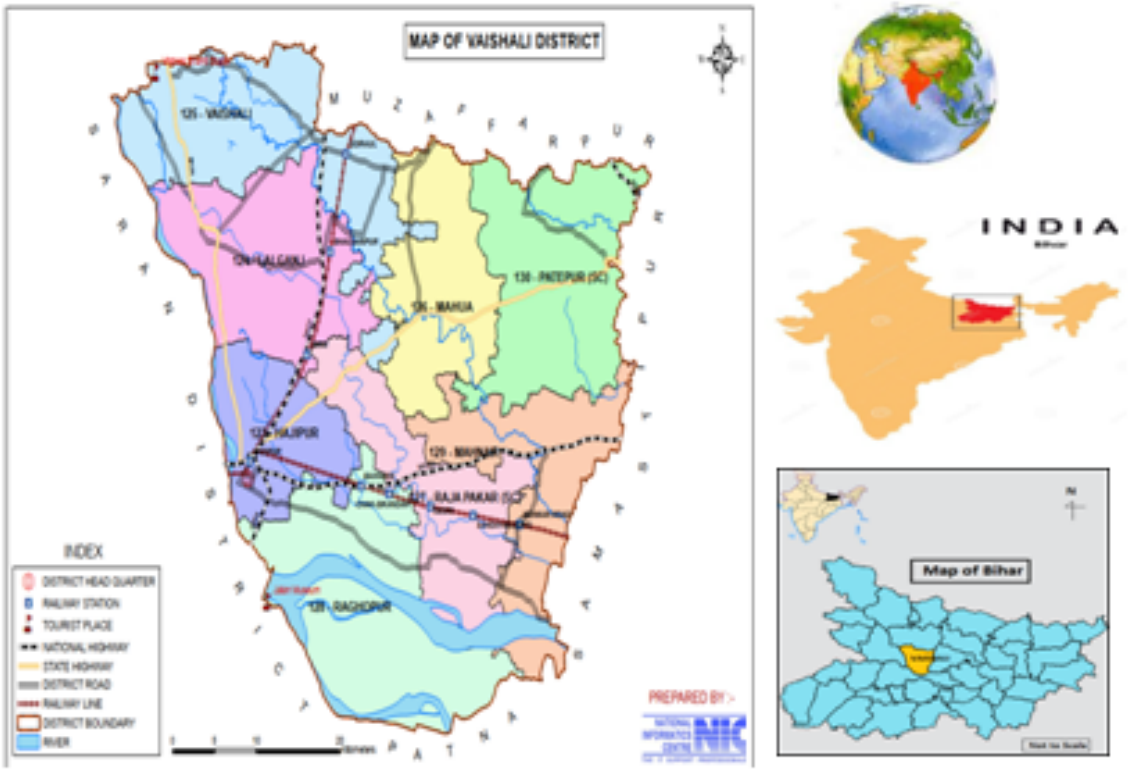
1.14	**Include Digital maps of the district for**	**Location map of district within State as Annexure I**	**Enclosed: Yes**
		Mean annual rainfall as Annexure II	Yes
		Soil map as Annexure III	Yes

Annexure I

Agro climatic Zones of Bihar

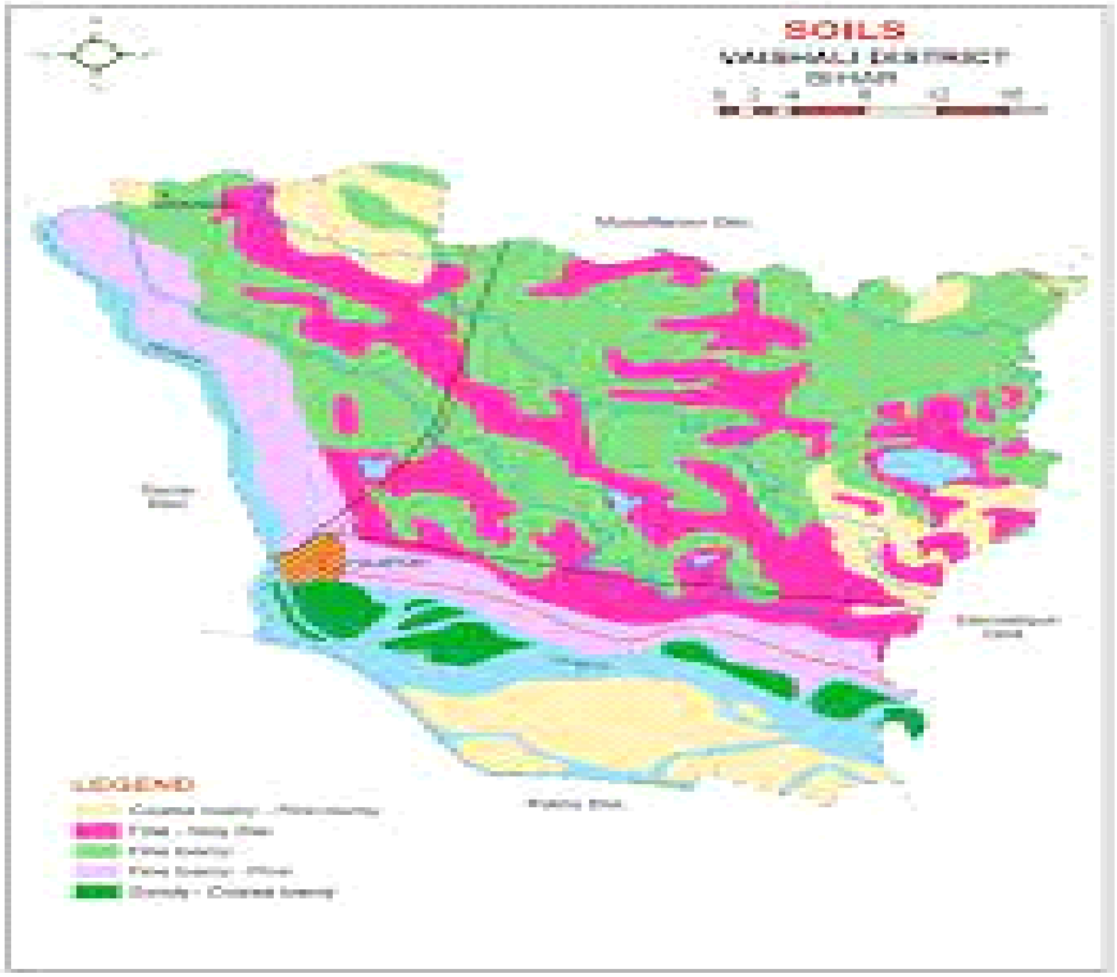


Source: krishi.bih.nic.in



Location of the Vaishali District

Annexure II



Source: Soil Testing Lab, Vaishali

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/Cropping system**	**Change in crop/cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks 1st week of July	Up land	Rice-wheat-green gram Pigeon pea-green gram Maize+Potato-mustard-green gram Sesame-Lentil-Rice	**Early Rice** *(R. Neelam, Prabhat, R. Bhagwati)*- **Wheat:** *(HD-2967, HD-2733, DBW-39, DBW- 187, DDW 48, HD 3226)* **Pigeon pea-green gram** **Greengram:** *(IPM-02-03, IPM 99-125, HUM 12, IPM 02-14)* **Arhar:** *R. Arhar 1, MAL-03, Narendra Arhar-1, PA 291)* **Maize (***Saktiman-4, Saktiman-5, R. Makka 4)* **Mustard** *(R. Suflam, PM 30, PM 32, Griraj, NRCDR 2,* **Toria** : *(R. Sarsow-1, Swarna, NRCYS 05-02)* **Green gram:** *(IPM 02-03, HUM-16, PUSA Vishal, IPM 07-05, IPM 02-14)*	ICM, INM, DSR, IPM	RPCAU, Pusa intervention: Community irrigation, 3hP pump, solar tree
	Medium	Rice-wheat	**Rice** (*R. Sawarna, R. Kasturi, R. Sweta,)*		

			Wheat: *(HD-2964, HD-2733, DBW-187, Rajendra Genhu*)		
	Low land	Rice-wheat	**Rice** *(Rajshree, R. Mansuri)*–**Wheat** (*R. Genhu-3, R. Genhu 4, HI 1563, , HD 3226, HD-2967*) Medium to long duration		

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/Cropping system**	**Change in crop/cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 week 3rd week of July	Upland fine loamy soils	Sesame-Lentil-Rice	Early Rice –Wheat Sesame-Lentil-Rice **Rice:** R. Bhagwati, R. Neelam, Sahbhagi, Prabhat, Sabor Ardhjal, Pusa Basmati. Wheat: *(HD-2967,HD-2733, DBW-303, DBW- 187, DBW 222)* **Sesame**: Krishna, YLM 11, Pragati, RT 351. **Lentil-** HUM-57, IPL 321, IPL 316, L 4717 **Greengram:** IPM 02-3, MH 450, GAM 5, GM 4, IPM 02-14	ICM, INM, DSR, IPM	Seed from RPCAU, Pusa, TCA, Dholi, NSC, ICAR institute RPCAU Technology -3hP pump, community irrigation, solar tree,
		Rice-wheat	Rice-Wheat **Rice:** Prefer medium to short duration verities like R. Bhagwati, R. Neelam, Prabhat, CR Dhan 315	❖ ICM, INM, DSR, IPM ❖ Raised staggered community nursery preferably with medium duration	

				varieties in mid and low lands ❖ Normal sowing of rice can be used with enhanced NPK to boost the early vegetative growth in late plantings under sufficient moisture ❖ Intercultural for timely weed management in DSR	
	Medium land	Rice-Wheat	Rice-Wheat Direct sowing/20days old Dapog Seedlings with medium to short duration varieties: R. Bhagwati (110-120), R. Neelam , Prabhat	❖ Where field is moist, direct seeding of medium duration varieties (125-&130 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	RPCAU, Pusa interventio n: Communit y irrigation, 3hP pump, solar tree

				availability of young seedling for transplanting of medium duration varieties by first fortnight of August in mid and low lands	
	Low land	Rice-Wheat Makhana in pond local variety	Rice-Direct/Dapog seedlings with Rajshree, R. Sweta, R. Suwasni	❖ Raise staged community nursery preferably with short duration varieties in mi and low lands ❖ Transplant with 30-35 days old seedling may be used with 3-4 seedling per hill with close spacing ❖ Enhance dose of nitrogen with full basal dose of NPK at the time of transplanting to boost the early vegetative growth in late planting under sufficient moisture ❖ Timely intercultural for weed	RPCAU, Psa technology: Community irrigation, 3 HP pump, Solar tree

				control in direct seeded rice ❖ Life saving irrigation ❖ Organic manure ❖ Liquid fertilizers with fertigation	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/Cropping system**	**Change in crop/cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Early season drought (delayed onset) Delay by 6 weeks 1st week of August	Upland Fine loamy soils	Rice-Wheat Maize-Green gram	Early Rice- Wheat Black gram/Finger millet-Wheat **Black gram**:-T 9, Navin, Pant Urd 30, Pant Urd 19 **Finger millet**: RAU 7, , Co-1 **Rice**- Prabhat, R. Neelam, R. Bhagwati, CR Dhan 315	Direct sowing of rice, application of potassic fertilizer at vegetative stage, Dapog seedlings can be used under moist conditions	Seed from RPCAU, Pusa, NSE, TDC, BRBN etc. RPCAU, Pusa intervention: Community irrigation, 3hP pump, solar tree
	Medium land	Rice-Wheat	Rice (Short duration) Wheat black gram/Finger millet-Wheat	DSR, Early sowing of rice	

			Black gram T-9, Navin, Pant Urad 30, Pant Urd 19 Finger Millet- RAU 7		
	Low land	Rice-Wheat-Green gram	Rice (short duration)-Wheat Rice-Prabhat, R. Neelam, R. Bhagwati If dry spell continues, direct seedling of short duration rice varieties (100 days) can be done in mid lands by first fortnight of August and extra short duration (75-85 days) up to 25th August	❖ 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 ❖ DSR ❖ Raised suggested community nursery preferable with medium duration varieties in mid and lowland ❖ Enhanced basal dose of NPK to boost the early vegetative growth ❖ Application of fertilizes especially phosphorus and potash to be ensured	

				under late transplanted conditions in severely affected district ❖ Life irrigation	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/Cropping system**	**Change in crop/cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks 3rd week of August	Upland Fine loamy soils	Rice-Wheat	September: Toria-Maize+Potato-Urd Rice: Prabhat, R. Neelam, R. Bhagwati	❖ Moisture conservation ❖ Inter cultivation ❖ Sowing of Rabi crops such as ❖ Wheat (DBW 187), Lentil (HUL 57), Chickpea (GNG 1958), ❖ Linseed (Garima) and Pea/Potato	Seeds from RCAU, Pusa, NSC, TCA, Dholi, DSF Dholi, BRBN etc.
	Medium land	Maize-Wheat	Sesame-Rabi maize Sesame-late wheat Sesame-Krishana, Pragati, RT 351	❖ Supply of contingency crop seeds of Toria, Maize (QPM) varieties, Saktiman 4, Saktiman 5 composite 65-70 days, R. Makka 4 corn) ❖ **Arhar:** (R. Arhar 1, IPA 203, NDA 1,) ❖ **Urd:** Navin and T 9	RPCAU, Pusa intervention: Community irrigation, 3HP pump, solar tree, bore well

				Millet need to be ensured for taking up of sowing in September in midlands ❖ Fodder crops ❖ Sorghum: MP Chari, CSH 24 (Multicut), ❖ Maize: Pratap, J 1006, African Tall, Makka Chari 6 ❖ Bajra (HB 3 & HB 4) in combination with legume ❖ Napier grass: (NB 7, NB 8, CO 4) ❖ Guiney Grass (BG 1, BG 2), ❖ Cowpea and horse gram) can be taken up wherever feasible to meet the fodder requirement in deficit rainfall districts	
		Pigeon pea-Greengram	September Pigeon pea-Green gram September-Pigeon pea : R. Arhar 1, P 9, Narendra Arhar 1, NDA 2, BND 711	Green manuring with Dencha (PD1, CSD 137)	RPCAU, Pusa intervention: Community irrigation, 3HP pump, solar tree
		Rice Wheat	Direct Seeded Rice (DSR) with short	❖ Direct Seeded of Rice	

			duration (80-90 days) varieties (R. Neelam Prabhat, CR Dhan 315) can be taken up in midland till the end of August subject to availability of least one assured irrigation	❖ 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 seedlings in rice ❖ Enhance 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; Saktiman 3, Saktiman 4 ❖ Arhar (R. Arhar 1, Pusa Arhar 16, NDA 1) **Urd** (Navin, T 9), ❖ Napier grass (CO 4, NB 7, NB 8 ❖ Guiney grass (BG 1, BG 2) can be taken up wherever feasible to meet the fodder requirement in deficit rainfall districts	

	Low land	Rice-Potato+ Maize	Rice-Potato/wheat **Rice**: R. Sweta, R. Bhagwati, R. Neelam, Prabhat	❖ Double transplanting of rice (Karuhan) can be done with 30+45 days old seedlings of long duration or photosensitive Varieties up to 30 August with close planting (40-45 hills per square meter) ❖ Application of organic manure and vermicompost initially for rice and other crops ❖ Sowing of Rabi crops such as wheat, lentil, chickpea, mustard (PM 30, PM 28, R. Suflam) and Vegetable can be taken up on time for timely supply of inputs and in a way Rabi production would compensate the production loss during Kharif ❖ Fodder crops ❖ Sorghum:MP Chari, CSV 24 ❖ Maize: African Tall, ❖ Bajara: HB 1 in combination with legume (cowpea and horse gram)	RPCAU, Pusa intervention: Community irrigation, 3hP pump, solar tree

				can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts ❖ Napier grass (CO 4, NB 7)	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/Cropping system**	**Change in crop/cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Upland	Rice-Wheat Rice-Prabht, R. Neelam, R. Bhagwati	❖ Gap filling ❖ Thinning	❖ Timely intercultural for weed control in direct seeding rice ❖ Mulching ❖ Conservation tillage ❖ Life saving irrigation ❖ Balance dose of fertilizer	RPCAU, Pusa intervention: Community irrigation, 3HP pump, solar tree
	Medium land	Maize –Wheat Maize-Shaktiman 3, Saktiman 4, Pusa Hybrid Makka 3, R. Makka 3	❖ Gap filling		
		Pigeon pea-Green gram Pigeon pea-R. Arhar 1, Pusa Arhar 9, NDA 2	❖ Pre sowing irrigation ❖ Higher seed rate		

			❖ Gap filing through dapog nursery	❖ Use of organic manure	
	Lowland	Rice-Wheat-Greengram Rice- R. Bhagwati, R. Sweta, R. Mahsuri, Rajshree	❖ Gap filling through dapog nursery		

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5mm)	**Major Farming situation**	**Normal Crop/Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Upland	Rice-Wheat	❖ Gap filling of existing crop ❖ Postponement of top dressing	❖ Inter culturing ❖ Mulching ❖ Conservation tillage ❖ Foliar spray with (1%) Urea or MOP	RPCAU, Pusa intervention: Community irrigation, 3HP pump, solar tree
	Medium land				
	Low land				

				❖ Life saving irrigation ❖ Organic manure use	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell)	**Major Farming situation**	**Normal Crop/Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering/ fruiting stage	Rice-Wheat	Rice	❖ Adopt IPM practices ❖ Foliar application with 2% urea or MOP	❖ **Intercultural** ❖ **Mulching** ❖ **Conservation tillage** ❖ **Life saving irrigation**	RPCAU, Pusa intervention: Community irrigation, 3HP pump, solar tree

Condition			**Suggested Contingency measures**		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/Cropping system**	**Change in crop/cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Terminal drought (Early withdrawal of monsoon)	Upland	Rice-wheat/maize/vegetable	❖ Foliar spray with (1%) urea or MOP	Open the furrow during evening and left furrow open	RPCAU, Pusa intervention: Community

	Medium land		❖ Adopt IPM practices ❖ Mulching ❖ Life saving irrigation	overnight and plank in the next morning before sunrise for growing of early Rabi crops like wheat, Rabi maize/pulses/oilseeds/ vegetable	irrigation, 3HP pump, solar tree
	Lowland				

2.12 Drought – Irrigated situation

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/Cropping system**	**Change in crop/cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in canals due to low rainfall	Note applicable				
Limited release of water in canals due to low rainfall					

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/Cropping system**	**Change in crop/cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**

Non release of water in canals under delayed onset of monsoon in catchment	Not applicable

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/Cropping system**	**Change in crop/cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Lack of inflows into tanks due to insufficient/delayed onset of monsoon	Upland Medium land Lowland	Rice-Wheat	Short duration Rice-Pigeon pea	❖ DSR ❖ Life saving irrigation ❖ Mulching ❖ Application of organic manure and vericompost	Seeds from RPCAU, Pusa. DSF, Dholi, NSC & BRBN etc. RPCAU, Pusa intervention: Community irrigation, 3HP pump, solar tree

Condition			**Suggested Contingency measures**

	Major Farming situation	Normal Crop/Cropping system	Change in crop/cropping system including variety	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Upland Medium land Lowland	Rice-Wheat	Short duration of Rice-Pigeon pea	❖ Lifesaving irrigation ❖ Mulching ❖ Application of organic manure and vermicompost ❖ Green manuring (Dencha, Sunhemp, Cowpea)	Seeds from RPCAU, Pusa. DSF, Dholi, NSC & BRBN etc.

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

Condition	Suggested Contingency measures			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post-harvest**
Rice, Maize, Pigeon pea, vegetable	Provide drainage	Provide drainage	-	-
Horticulture				Self stage
Mango	Provide drainage	Provide drainage	Provide drainage	
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 span[2]				

Rice	Replacing with dapog nursery seedling, Kharuhan (Double transplanting) method			
Maize	Earthing up			
Pigeonpea	Earthing up			
Vegetables	Grow nursery on raised bed and poly tunnel			
Horticulture				
Mango Litchi Banana Guava	Replanting	Provide wind break to reduce the wind speed	Provide wind break	
Outbreak of pests and disease due to unseasonal rains	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post-harvest**
Rice	❖ Seedling treatment with granular insecticide-Bavistin 2gm/kg seed ❖ Maintain shallow water in nursery beds ❖ Providing good drainage	❖ Use copper fungicides against Bacterial leaf blight ❖ Split application of N fertilizer (3-4 time)	❖ Harvest at physiological maturity	❖ Proper drying and safe storage
Maize	❖ Drainage and yellowing mainly due to nitrogen deficiency apply N split doses	❖ Foliar blight control through Mancozeb @2.5g/l ❖ Tebuconozol @ 2.5g/lit. of water (2-3 application at 10-15 days interval)	❖ Cob harvesting from standing crop ❖ Harvest at physiological maturity	❖ Storage in safe places like farmer warehouse/tent covering of produce ❖ Ensure 10-12% moisture in grains before storage

				❖ Proper drying
Pigeon pea	❖ Provide drainage ❖ Seed treatment with 1gCarbendizim+2gThiram/ kg seed	Provide drainage	Provide drainage	❖ Provide drying ❖ Storage at safe place and transportation
Horticulture				
Vegetables	❖ Drainage management	❖ Drainage management	❖ Drainage management	
Mango	**Anthracnose** ❖ The foliar infection can be controlled by spraying of Copper Oxychloride (0.3%) ❖ Use of bio-control agents viz *Streptosporangium pseudovulgare* Bacterial canker ❖ Regular inspection of orchards, sanitation and seedling certification are recommended as preventive measures ❖ Mango stones for raising seedlings (root stock) should always be taken from ❖ Use of wind breaks helps in reducing	❖ Apply Bavistin/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%) & Copper Oxychloride (0.1%) during second week of December	**Mango powdery mildew** ❖ Prune diseased leaves and malformed panicles harbouring the pathogen to reduce primary inoculums load ❖ Spray wettable sulphur (0.2%) when panicles are 3-4" in size ❖ Spray dinocap (0.1%) 15-20 days after first spray ❖ Spay Tridemorph (0.1%) 15-20 days after second spray ❖ Spraying at full bloom needs to be avoided **Mango bacterial canker** ❖ Three sprays of Streptocycline (200ppm)	Harvest at proper time **Anthracnose** ❖ Pre harvest sprays of Hexaconazol (0.01%) or Carbendazole (0.1%) at 15 days interval should be done in such a way that the last spray falls 15 days prior to harvest ❖ Diseased leaves, twigs and fruits, should be collected and burnt to avoid the spread for next season

	brushing/wounding and thus reduces the chance of infection		at 10 days intervals reduce fruit infection ❖ In severe infection, spraying of Streptocycline (300 ppm) or Copper Oxychloride (0.3%) is more effective	
Litchi	**Fruit fly** Monitor adult fruit flies emergence by using Quanualphos 2.5ml/liter water or pheromone traps	**Fruit fly** First Spray Quanalphos 25EC 2.0 ml/litre water plus molasses 0.1% after 10-12 days spray Imidachlorpid 2ml/litter water	Harvest at proper time	**Fruit fly** ❖ Collect all fallen infested fruit and put 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	**Seedling/nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Rice	❖ Provide drainage ❖ Retranslating through dapog nursery seedling	❖ Provide drainage ❖ Gap filling ❖ 40-50 days old seedlings may be used	❖ Provide drainage ❖ Harvest at physical maturity	Storage at safe place

	❖ Gap filling	❖ Kharuhan (double planting method)	❖ Lentil as paira crop can be taken	
Maize	❖ Provide drainage ❖ Re-sowing ❖ Gap filling	❖ Provide drainage	❖ Provide drainage ❖ Harvest at physiological maturity	Storage at safe place
Pigeonpea	❖ Provide drainage ❖ Re sowing ❖ Gap filling	❖ Provide drainage	❖ Provide drainage ❖ Harvest at physiological maturity	
Horticulture				
Mango Litchi Banana Guava	❖ Re planting ❖ Gap filling ❖ Provide drainage	❖ Drenching with copper fungicides ❖ Provide drainage	❖ Drenching with copper fungicides ❖ Provide drainage	
Continuous submergence for more than 2 days[2]				
Rice	❖ Gap filling ❖ Re sowing	❖ Short duration rice variety	❖ Toria/late wheat if completely damaged	Storage at safer place
Maize	❖ Re sowing	❖ Re sowing of gap filling	❖ Toria/Late wheat if completely damaged	Storage at safer place

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

Extreme events type	**Suggested Contingency measures**			
	Seedling/ nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat wave				
Maize	Provide irrigation	Provide irrigation	Provide irrigation	

Pigeonpea	Provide irrigation	Provide irrigation	Provide irrigation	
Wheat	Provide irrigation	Provide irrigation	Provide irrigation	
Horticulture				
Mango	Provide irrigation	Provide irrigation	Provide irrigation	
Litchi	Provide irrigation	Provide irrigation	Provide irrigation	
Papaya	Provide irrigation	Provide irrigation	Provide irrigation	
Banana	Provide irrigation	Provide irrigation	Provide irrigation	
Cold wave				
Wheat, Maize, Mustard, Potato, Pulses	-	❖ Provide light irrigation ❖ Mulching	-	-
Horticulture				
Vegetables	-	❖ Provide light irrigation ❖ Mulching	-	-
Frost				
Wheat Chickpea, Pigeonpea, Lentil	-	❖ Provide light irrigation ❖ Mulching	-	-
Horticulture				
Vegetables	-	❖ Provide light irrigation ❖ Mulching	-	-
Tomato & Potato		❖ Earthing up ❖ Provide irrigation ❖ mulching		Harvest in dry weather
Hailstorm, cyclone	Note applicable			

2.5.1 Livestock

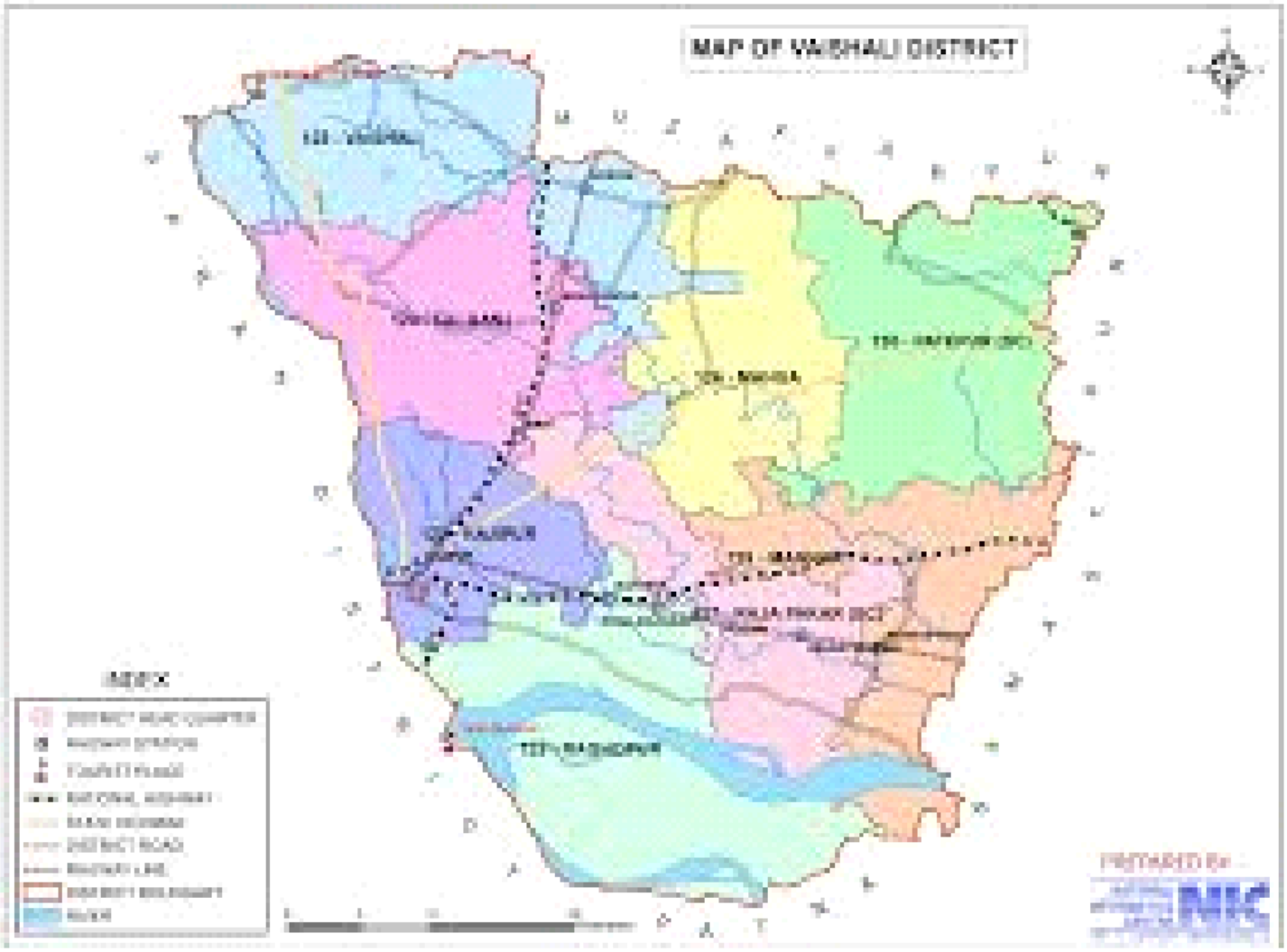
	Suggested Contingency measures		
	Before the event	**During the event**	**After the event**
Drought	❖ Ponds renovation, water harvesting structures, water recharge structures and water recycling	❖ Use of water from the sources available for drinking and fodder cultivation ❖ Avoid feeding unirrigated and stunted sorghum to avoid poisoning from prussic acid	❖ Recharging of the ground water.
Floods			
Feed and fodder availability	❖ Development of fodder bank at village level with available dry fodder available. **Maize**: *African tall*, *Shaktiman*, Vijai, Moti**Sorghum/ Jowar**-Var. *MP Chari COFS-29 and DCH-106 (multicuts).***Cowpea**: BL-1, BL-2, *EC 4216 and FC-8.***Fodder Oats**: UPO- 212, JHO -822.**Berseem**: JB-2, Wardan, BL-10, BB-3 and Mascavi etc. ❖ Increase perennial fodder crops cultivation those enabling multi-cuts. Ex. *Hybrid Napier CO-3, CO-4, NB-21, Pusa Giant* as well as **Guinea Grass** with varieties *PGG-13, 14, 19*, ❖ Avoid burning of paddy/ wheat straw. ❖ Storage of feed and fodder in the form of silage and Hay for the lean period ❖ Source of unconventional feed for feeding to animal. ❖ Purchase sufficient quantity of feeds/ feed	❖ Feeding of condensed dry fodder, complete feed block ❖ Utilizing of stored hay or silage feed during this period. ❖ Feeding of Urea Mineral Molasses Blocks (UMMB) ❖ Unconventional feed: Azolla, and Tree leaves such as subabul, bamboo, banyan leaves, Peepal and sheesham ❖ Feeding of Urea Mineral Molasses Brix (UMMB) ❖ Weaning practice needs to be adopted which can considerably reduce the nutrient requirement of animal. ❖ Never feed wet grain to avoid chances of moulds and mycotoxin infection. ❖ Nutrient density should be increased	❖ Maintenance/ repair of Silopits and feed and fodder stores. ❖ Providing balance ration adequate in minerals and vitamins. ❖ Replenish the fodder banks with quality area specific varieties of fodder. ❖ Provide Urea molasses mineral block. ❖ Awareness on feeding management of

	ingredients as per the storage facilities and requirement for poultry production. ❖ Prepared balanced feed formulation using available feed resources in poultry. ❖ Arrangement of safe storage of Stocking of sufficient dry fodders, feed and green fodder (ensiled feed)to transport to the flood affected areas for livestock population.	in proportion to feed consumption. ❖ Provision of concentrate ingredients such as grain, brans, chunnies oilseeds cakes low grade grains which are unfit for human consumption. ❖ Feeding of tree leaves such as subabul, bamboo, banyan leaves, Peepal leaves, sheesham leaves and use of locally available unconventional feeds like azolla.	livestock and poultry. ❖ Use of Toxin binder should be mixed in poultry feed to check mycotoxicosis.
Drinking Water	❖ Identification of water resources available at the different areas of district. ❖ Ponds renovation, water harvesting structures, water recharge structures and water recycling to be created. ❖ Storage of bleaching powder for chlorination, chlorination plants set up, water sanitizers.	❖ Clean potable water free from microbes. ❖ Water should be treated with commercially available halogen releasing tablets.	❖ Supplementation of vitamins and minerals.
Health Management	❖ All areas of the district should be earmarked for flood prone. ❖ Veterinary Preparedness with Medicines,Vaccines and provision for mobileambulatoryvan. ❖ Procure and stock emergency medicines including Broad spectrum antibiotics ❖ Non - Streoidal Anti Inflammatory drugs (NSAIDs), Fluids and Electrolytes and other additives.	❖ Safeguard livestock from submergence areas and arrangement of opening of cattle camps in elevated areas. ❖ Transportation of animals to higher elevated places during flood. ❖ Service of Mobile clinic teams should be planned consisting of dedicated and experienced technical workers with lifesaving medicine for livestock.	❖ Keep close surveillance on disease outbreak. ❖ Performing of Ring vaccination (within 8-10km radius) programme in case of any disease outbreaks.

	❖ Mass vaccination of important diseases of livestock to achieve herd immunity. ❖ Vaccinate the important diseases of poultry including Mareks disease, RD, IBD and Fowl pox etc. ❖ Routinely deworming of animals with broad spectrum anthelmintic -Oxyclozanide + Levamisole +Silymarin in bolus for adult bovine population and suspension form for young and caprine population as well as Ivermectin for controlling endo and ecto parasites infestation in animals. ❖ Keep the sufficient stock of bleaching powder and lime. (disinfectant) ❖ Arrangement of transportation of animals from low lying or flood vulnerable areas to safer place. ❖ Provision of alternative power generating facilities in commercial poultry production ❖ Conducting training Programme on thematic areas of disease management for livestock and poultry. ❖ Insurance coverage for poultry birds, shed, equipments and feed mills.	❖ Use of probiotics and other feed additives should be administered to livestock and poultry.	❖ Repair of the shed. ❖ Disinfection of livestock and poultry sheds should be done with the help of potassium permanganate, bleaching powder, phenol, carbolic acid etc. ❖ Identification and quarantine of sick/affected livestock as preventive measures. ❖ Treatment of drowning and traumatic injuries, aspiration pneumonia, lameness and other surgical cases in the health camp ❖ Proper disposal of carcass / dead

			bodies. ❖ Short term fodder plantation should be encouraged to livestock owners. ❖ Supplementation of broad spectrum anthelmintics and probiotics. ❖ Awareness programme on water borne and Zoonotic diseases to be imparted.
	Suggested contingency measures		
Cyclone	**Before the event**	**During the event**	**After the event**
	❖ Arrangement of safe storage of feed and fodder	❖ Tethering of small animal should be avoided. ❖ Animal shouldn't be allowed for grazing	❖ Repair of the shed. ❖ Harvesting of fodder crops to the feed animals. ❖ Provide ad-libitum water with vitamins and minerals
Heat/ cold waves			
	❖ Plantation around the shed for heat vulnerability areas.	❖ Livestock and poultry should be provided shelter/shed to save from	❖ Animal should be checked after the

	❖ Important lifesaving Medicine should be available during the adverse condition.	extreme cold and heat waves variables. ❖ Poultry house should be made comfort temperature zone through the use of foggers, sprinklers and air velocity fans during heat waves. ❖ Adequate energy rich feed during cold. ❖ Electrolytes and Vitamin C should be provided during extreme heat variables. ❖ Use of probioticsin the feeding program of livestock and poultry. ❖ Animal should be given medicine to relieve heat stress (anti- stress medicine).	adverse condition by Veterinarian. ❖ Provide balanced ration fortified with probiotics and minerals to the livestock ❖ Provide clean ad-libitum water to the animals. ❖ Young animals should be taken care of any physiological changes. ❖ Respiratory diseases in livestock and poultry should be examined and treated with broad spectrum antibiotics.


MAP OF VAISHALI DISTRICT
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