

**District Wise Contingency Plan**  
**KVK, Imphal West district**  
**ICAR Research Complex for NEH Region**  
**Lamphelpat, Imphal, 795004**  
**8<sup>th</sup> June, 2010**  
**ICAR Research Complex for NEH Region**  
**Umroi Road, Umiam, Meghalaya**  
**State: Manipur**  
**Agriculture Contingency Plan for District: Imphal West**

<b>1.0 District Agriculture profile</b>			
1.	<b>Agro climatic /ecological zone</b>		
2.	Agro Ecological Sub Region (ICAR)	Sub-tropical plain	
3.	Agro-climatic Region (Planning Commission)	Eastern Himalayan	
4.	Agro Climatic Zone (NARP)	Sub-tropical plain	
5.	List all the districts or part thereof falling under the NARP Zone	Imphal West, Imphal East, Thoubal, Bishnupur and foothills of Senapati	
6.	Geographic coordinates of district	Latitude and	Longitude
		Altitude	
		24 45' N	93 54' E,
			775 msl
7.	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ICAR Research Complex for NEH Region, Manipur Centre, Lamphelpat-795 004	
8.	Mention the KVK located in the district	Imphal West District , Manipur	

1.2	Rainfall	Normal rainfall (mm)	Normal rainy days (nos.)	Normal onset	Normal cessation
1.	SW monsoon (June-Sep)	830.29	55	-	-
2.	NE Monsoon (Oct-Dec)	200.80	15	-	-
3.	Winter (Jan-March)	122.40	9	-	-
4.	Summer (Apr-May)	316.30	21	-	-
5.	Annual	1469.79	100	-	-

1.3	Land use pattern of the district (latest statistics)	Geographic area	Forest area	Land under agril. use	Permanent pastures	Cultivable waste land	Land under Misc tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area (000, ha)	51.9	2.13	28.25	-	0.24	-	0.22	0.14	-

1.4	Major Soils (common names like shallow red soils etc.)	Area ('000 ha)	Per cent of total
	1 Alluvial	NA	NA
	2 Black soil	NA	NA
1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	21.24	132.99
	Area under more than once	7.01	
	Gross cropped area	28.24	

1.6	Irrigation	Area ('000 ha)	Percent (%)	
	Net irrigated area	2.73		
	Gross irrigated area	3.15		
	Rainfed area	25.51		
	Sources of Irrigation	Number	Area (000' ha)	% area
	Canal	-	2.03	74.36
	Tanks	NA	NA	NA

	Open wells	NA	NA	NA
	Bore wells	NA	NA	NA
	Lift irrigation	NA	0.70	25.64
	Micro-irrigation	NA	NA	NA
	Other sources	NA	NA	NA
	Total Irrigated Area	2.73	NA	-
	Pump sets	685	NA	NA
	No. of Tractors	249	NA	NA
	<b>Ground water availability and use</b>	<b>No of blocks</b>	<b>% area</b>	<b>Quality of water</b>
	Over exploited	NA	NA	Imphal River is the main source of water and is good and permissible classes whereas Nambul River is the source of irrigation for agriculture activities and some small canals and streams are also excellent in quality.
	Critical	NA	NA	
	Semi-critical	NA	NA	
	Safe	NA	NA	
	Ground water quality	NA	NA	
	Wastewater availability and use	NA		

**1.7 Area under major field crops & horticulture etc (2008-09)**

1.7		Major Field Crops cultivated	Area ('000 ha)*					
			Kharif		Rabi		Summer	Total
			Irrigated	Rainfed	Irrigated	Rainfed		
	1	Rice	8.97	13.57	-	-	-	22.54
	2	Pea	NA	NA	0.09	0.20	-	0.29
	3	Potato	NA	NA	0.25	NA	-	0.25
	4	Rapeseed-mustard	-	-	0.10	0.54	-	0.64
	5	Maize	-	0.10	-	-	-	0.10
	6	Other	NA	NA	NA	NA	1.63	1.63

1.7		Horticulture crops-Fruits	Total area	Irrigated *	Rainfed *
	1	Pineapple	0.5		
	2	Banana	0.53		
	3	Passion fruit	0.09		
	4	Lime/lemon	0.08		
	5	Mango	0.48		
	6	Other crops	0.74		

\*For Horticulture crops, only total area need to be given

1.7		Horticultural crops -Vegetables	Total area (2008-09)	Irrigated	Rainfed
	1	Cauliflower Variety: Snow Crown, White Flash	0.30	0.30	
	2	Cabbage Variety: Green Hero, Rare Ball	0.35	0.35	
	3	Tomato Variety: Sel.9-A, Hybrid from private company	0.15	0.15	
	4	Onion Variety: Nasik Red, Local Small	0.1	0.1	
	5	Other	0.29	0.20	0.09

1.7		Flowers	Total area	Irrigated	Rainfed
	1	Not available			

1.7		Medicinal and Aromatic crops	Total area	Irrigated	Rainfed
	1	Not available			

1.7		Spice & Plantation crops	Total area	Irrigated	Rainfed
	1	NA	NA		

1.7		Fodder crops	Total area	Irrigated	Rainfed
	1	NA	NA		
		Total fodder crop area	NA		
		Grazing land	NA		
		Sericulture etc	0.10		0.10
		Others (specify)	NA		

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	27.08	16.64	43.72
	Crossbred cattle	2.89	7.52	10.41
	Non descriptive Buffaloes (local low yielding)	1.02	0.93	1.95
	Graded Buffaloes	NA	NA	NA
	Goat	1.08	1.50	2.58
	Sheep	0.57	0.54	1.11
	Others ( Pig)	4.37	6.12	10.49
	Commercial dairy farms (number)	NA	NA	NA

1.9	<b>Poultry</b>	<b>No. of farm ('000)</b>		<b>Total No. of birds</b>			
	Commercial	NA		171.49			
	Backyard	NA		211.51			
1.10	<b>Fisheries (Data source : Chief Planning Officer)</b>						
	A. Capture						
	<b>i) Marine</b> (Data source: Fisheries Department)	<b>No. of fishermen</b>	<b>Boats</b>		<b>Nets</b>		<b>Storage facilities (Ice plants etc)</b>
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake& trap nets)	
		Not applicable	NA	NA	NA	NA	NA
	<b>ii) Inland</b> (Data source: Fisheries Department)	No. of farmer owned ponds		No. of reservoirs		No. of village tanks	
		NA		NA		NA	
	<b>B. Culture</b>						
			<b>Water Spread Area (ha)</b>		<b>Yield (t/ha)</b>		<b>Production ('000 tons)</b>
	<b>i) Brackish water</b> (Data source: MPEDA/ Fisheries Dept)		NA		NA		NA

	<b>ii) Fresh water</b> (Data source: Fisheries Dept)	1355.6	2.5	3.39
	Others	-	-	-

**1.11 Production and productivity of major crops (Average of last 5 years: 2004, 05, 06, 07, 08)**

1.11	Name of the crop	Kharif		Rabi		Summer		Total	
		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								
	Rice	57.53	3045.53	-	-	-	-	57.53	3045.53
	Rapeseed-mustard	-	-	0.51	800.00	-	-	0.51	800.00
	Pea	-	-	1.61	1900	-	-	1.61	1900.00
	Cabbage	-	-	6.19	11050	-	-	3.64	3115.25
	Cauliflower	-	-	3.59	9960	-	-	2.31	2247.50



	Potato	-	-	2.04	8160	-	-	2.04	8160
	Chilli	8.49	7510	-	-	-	-	8.49	7510
	Banana	8.79	12930	-	-	-	-	8.79	12930
	Tomato	2.59	12639	-	-	-	-	-	-
	Others	-	-	-	-	5.91	10622	5.91	10622

1.12	Sowing window for 5 major crops (start and end of sowing period)	Crop 1: Rice	2: Pea	3:Mustard	4:Cabbage	5:Cauliflower
	Kharif –Rainfed	June to July	-	-	-	July –Sep (off season)
	Kharif- Irrigated	June to July	-	-	-	-
	Rabi- Rainfed	-	Oct-Nov	Oct-Nov	Oct-Nov	Oct-Nov
	Rabi-Irrigated	-	-	Oct-Nov	Oct-Nov	Oct-Nov

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 diseases others(specify)			
	Rice	Leaf Blast	Stem borer, gall midge	
	Potato	Leaf blight		
	Tomato	Blight, Borer	Bacterial wilt	

\*Earlier table has now been converted to this format (Regular, Occasional and None)

<b>1.14</b>	<b>Include Digital maps of the district for</b>	<b>Location map of district with in State as Annexure I</b>	<b>Enclosed: Yes</b>
		<b>Mean annual rainfall as Annexure II</b>	<b>Enclosed: Yes</b>
		<b>Soil map as Annexure III</b>	<b>Enclosed: Yes</b>

## 2.0 Strategies for weather related contingencies

### 2.1 Drought

#### 2.1.1 Rainfed situation

Condition	Major Farming situation <sup>a</sup>	Crop/cropping system		Suggested Contingency measures			
				Change in crop/ cropping system	Agronomic measures	Remarks on implementation	
<b>Delay by 2 weeks (4<sup>th</sup> week of June)</b> <i>Kharif</i> sowing: 1 Fortnight of July	Medium lowland and clay to sandy soil( <i>kharif</i> cropping area)	Rice (RC Maniphou-7 and RC Maniphou -10)		Rice/mustard	-	-	
		Groundnut(ICGS-76)		No change	-	-	
		Pea (Arkel, Rachana, Local)		No change	-	-	
		Soybean (JS-335)		No change		-	
		Mustard (M-27,Local-Yella)		No change	-	-	
		Black gram		No change	-	-	
	Medium upland soils ( <i>Rabi</i> cropping areas)	<b><i>Kharif</i></b>	<b><i>Rabi</i></b>	<b><i>Kharif</i></b>	<b><i>Rabi</i></b>		
		Fallow	<i>Rabi</i> maize	No change	No change	-	-

Condition delayed onset	Major Farming situation	Crop/cropping system		Suggested Contingency measures			
				Change in crop/ cropping system	Agronomic measures	Remarks on implementation	
<b>Delay by 4 weeks (July) 2<sup>nd</sup> week</b> <i>Kharif</i> sowing: II Fortnight of July	Medium lowland and clay to sandy soils ( <i>Kharif</i> cropping area)	Rice		No change	-	-	
		Mustard		No change	-	-	
		Groundnut		No change	-	-	
		Soybean		Mustard	-	-	
		Black gram		No change	-	-	
	Clay to sandy soils ( <i>Rabi</i> cropping area)	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>		
		Fallow	Rabi maize	No change	No change	-	-

Condition	Major Farming situation	Crop/cropping system		Suggested Contingency measures		
				Change in crop/ cropping system	Agronomic measures	Remarks on implementation
<b>Delayed onset</b>						
<b>Delay by 6 weeks (July 4<sup>th</sup> week)</b> <i>Kharif</i> sowing: I Fortnight of August	Medium lowland and clay to sandy soils ( <i>Kharif</i> cropping area)	Rice RC Maniphou-7		No change	-	-
		Groundnut		No change	-	-
		Soyabean		No change	-	-
		Blackgram		No change	-	-
	Clay to sandy soils	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	

	(Rabi cropping area)	Fallow	Rabi maize	No change	No change	-	-
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Condition Delayed onset	Major Farming situation	Crop/cropping system		Suggested Contingency measures				
				Change in crop/ cropping system		Agronomic measures	Remarks on implementation	
Delay by 8 weeks (August 2nd week) <i>Kharif</i> sowing: II Fortnight of August	Medium lowland and clay to sandy soils ( <i>Kharif</i> cropping area)	Rice		No change		Raised rice variety RC Maniphou -7 nursery where there is source of irrigation water and plant 40 days old seedlings 4-5/hill.	-	
		Groundnut		No change		-	-	
		Soybean		No change		Provide live saving irrigation at critical stages. Increase seed rate	-	
		Blackgram		No change		Provide live saving irrigation at critical stages. Short duration variety like T-9 (65-70 days) may be used	-	
	Medium lowland and clay to sandy soils (Rabi cropping area)	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	-		-
		Fallow	Maize	No change	No change			

**Normal, mid-season and terminal draught situations**

Condition Normal onset followed by 15-20 days dry spell after sowing leading to poor germination / crop stand etc	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on implementation
	Medium lowland and clay to sandy soils (Kharif cropping area)	Rice	Live saving irrigation may be given at nursery stage .Foliar application of urea 25 may be applied for vegetative growth. If germination % is less than 50% re-sowing of sprouted seed is recommended	Plough the field 3-4 times followed by harrowing to conserve the moisture .Apply 10-15t FYM/ha for retaining moisture and improving physical condition of soil.	
	Upland and clay to sandy soils (Rabi cropping areas)	Ground nut	If germination is poor, re sowing may be done	Furrow sowing along with mulching with straw, tree leaves	
		Soybean	Live saving irrigation may be at one week interval. If live saving irrigation is not possible, re sowing is recommended	Mulching with straw between the rows is recommended	
		Redgram	Left the plant as such since the crop can uptake water	Mulching with straw between the rows is suggested. Leaves fall from the plant serves as mulching	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on implementation
<b>Mid season drought (long dry spell, consecutive 2 weeks rainless period (&gt; 2.5 mm) At vegetative stage</b>	Medium lowland and clay to sandy soils ( <i>Kharif</i> cropping area)	Rice	Select upland rice variety like RC Maniphou-6. Split application of nitrogen and potash will be benefitted.	Thinning is must if plant population is too high . If applied FYM 10-15 t/ha which will retain soil nutrients and moisture availability	
	Upland and clay to sandy soils	Ground nut	Make furrows with 7 cm depth and sow the seed and cover immediately after sowing	mulching should be done in between the rows to conserve soil moisture	
			Earthing up should be done at 35 days DAS before peg formation	Weeding should be done to check plant nutrient uptake by weeds.	
		Soybean	Select short duration varieties JS-335,	Soil conserving crops should be raised in the field	
			Sow in furrows where moisture is available and cover immediately	To check the soil erosion and moisture conservation the seed should be sown against the slope Mulching in the rows will be benefitted for moisture conservation	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on implementation
<b>Mid season drought (long dry spell) at flowering /fruiting stage</b>	Medium lowland and clay to sandy soils ( <i>Kharif</i> cropping area)	Rice	Life saving irrigation at flowering stage	Apply split application of nitrogen and potassium	
			Repairing of bunds around field to check water loss		
		Ground nut	Earthing up should be done to increase peg formation	Mulching should be given between the rows by straw, tree leaves or possible by water hyacinth and azolla	
		Soya bean	Select short duration varieties JS-335,	Soil conserving crops should be raised in the field	
			Spray monocrotophos 40 EC @ 1.5ml/litre to control caterpillars	Mulching in the rows with be benefitted for moisture conservation	
				Leaves fall in the plot itself serves as moisture conservation moisture	



Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on implementation
Terminal drought	Medium lowland and clay to sandy soils (Kharif cropping area)	Rice	Harvest the crop for grain purpose	Plough repeatedly 3-4 times followed by harrowing to increase soil fertility and soil moisture for rabi season	
			If the expected yield is too poor, harvest the grain filled panicle only	The prepared field should be planned for rabi pulse and oil seed crops. For mustard var. M-27, pea var. Rachna may be recommended	
		Ground nut	Short duration varieties like JL-24 (100 days) TAG -24(100 days) usually infected by caterpillars and Tikka disease plant protection measure should be taken up	Left all the plants and roots to increase fertility for rabi crop	
		Soybean	Select short duration varieties JS-335,	Soil conserving crops should be raised in the field	
			Plant protection measure should be taken up	Mulching in the rows will be benefitted for moisture conservation	

### 2.1.2 Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	Normal crop/ cropping system	Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
Delayed / limited release of water in canals due to low rainfall	Medium lowland and clay to sandy soils ( <i>Kharif</i> cropping area)	Rice	Rice- mustard/ pea	Prepare rice seed bed near the pond or any other water source. Select var. RC maniphou-6 which required less water	
		Mustard	Mustard-rice	Zero tillage cultivation	
		Mustard	Rice –mustard	Zero tillage sowing followed by application of nitrogen fertilizer at 30days and 60 days DAP	
		pea	Rice-pea	Sow the seed of pea variety Rachna in well pulverized field until monsoon set	
				Soil moisture should be maintained at flowering stage	
				Spray Monocrotophos 40 EC @ 1.5ml/litre to control pod borer	

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

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	Vegetative stage	Flowering stage	Crop maturity	Post harvest
Rice	<ol style="list-style-type: none"> <li>1. Prepare bund around the field to save from water loss</li> <li>2. If the crop is submerged 5-7 days the plant will die so, the flood water will be drain out and maintained 5-8 cm</li> <li>3. Weeding should be done at tillering and PI stage. Plant protection measures should be taken up</li> </ol>	<ol style="list-style-type: none"> <li>1. Apply irrigation from ponds and rivers</li> <li>2. The flowering is very critical stage for the crop production if the crop is submerged up to flower part, the pollen grains will wash away and it will lead chaffy grains so, all the excess water caused by unusual rain should be drained out and maintain the same depth 5-8 cm</li> <li>3. An RC Maniphou variety is preferable. Frequent irrigation should be given to maintain water temperature and enhances vegetative growth</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain out the excess water</li> <li>2. Harvest the rice where 75% panicles are matured. Water should be draining out 10-15 days before harvested.</li> <li>3. Drain out water 10 days before harvesting</li> <li>4. If the temperature is raised disease and pest population is increased so plant protection measures should be taken up</li> </ol>	<ol style="list-style-type: none"> <li>1. Harvest and dry by making bundles to increase grain filling</li> <li>2. Dry the seed on a concrete floor or frequently turn over the seed until the seed dried</li> <li>3. Harvest when panicle is turned yellow 75% matured. Moisture level should be 10-12% and store properly for enhancing germination. Gunny bag storage is preferred and for seed proposes store in RC-bin can be used for 2 years</li> </ol>
Soyabean	<ol style="list-style-type: none"> <li>1. Weeding at 40 days should be done</li> <li>2. Excess water should be drain out since it is moisture sensitive plant</li> </ol>	<ol style="list-style-type: none"> <li>1. Weeding at 60 days after sowing</li> </ol>	<ol style="list-style-type: none"> <li>1. Mulching in between rows for moisture conservation</li> <li>2. Timely harvest when pods turn yellow</li> </ol>	<ol style="list-style-type: none"> <li>1. Dry the seed 3-4 days with plants and sun dried 2-3 days about 10-12% moisture content</li> <li>2. Threshing the plant and</li> </ol>

				<p>screening the seeds and removed other unwanted debris and sundry.</p> <p>3. Separate the grains and store in gunny bags</p>
Ground nut	<ol style="list-style-type: none"> <li>1. Earthing up in groundnut should be done</li> <li>2. Proper drainage should be made in and around the field</li> <li>3. Make the field clean by weeding</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain out the excess water to avoid water logging</li> </ol>	<ol style="list-style-type: none"> <li>1. All the matured seed should be harvested timely to prevent from germination</li> <li>2. Disease free pods should be harvested</li> </ol>	<ol style="list-style-type: none"> <li>1. Harvested crop, spread and sundry for 2-3 days</li> <li>2. Pods should be dried after harvesting reduced to 10% moisture.</li> </ol>
Black gram	<ol style="list-style-type: none"> <li>1. Proper bed should be prepared</li> </ol>	<ol style="list-style-type: none"> <li>1. Weedicide should not be applied in the black gram at any stage</li> <li>2. Hand weeding is preferred if possible</li> </ol>	<ol style="list-style-type: none"> <li>1. All the matured seed should be harvested timely to prevent from germination</li> <li>2. Harvesting should be done when crop is 75% matured</li> <li>3. Pods should not allowed to over mature to avoid shattering</li> </ol>	<ol style="list-style-type: none"> <li>1. pods should be harvested, dried and spread in the shed</li> <li>2. Dry the seed on a concrete floor and frequently turn over the seed until the seed dried</li> <li>3. Pods should be dried after harvesting so that moisture is reduced to 10%.</li> </ol>
Mustard	<ol style="list-style-type: none"> <li>1. Thinning should be done</li> <li>2. Apply recommended dose of fertilizers to give higher yield</li> </ol>	<ol style="list-style-type: none"> <li>1. Apply irrigation</li> </ol>	<ol style="list-style-type: none"> <li>1. Harvested as soon as it mature to avoid over ripening and prevent seed shattering</li> </ol>	<ol style="list-style-type: none"> <li>1. Proper drying should be done</li> <li>2. After proper drying, seed are stored in dry and cold place</li> </ol>
Outbreak of pests and	The control measures may be taken up as per package of practices			

diseases  
due to  
unseasonal  
rains

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## 2.3 Floods

Condition	Suggested contingency measure			
	Seedling /nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Early Rice	<ol style="list-style-type: none"> <li>Usually all the stagnant water should drain out and maintain 2-3 cm depth during the seedling stage.</li> </ol>	<ol style="list-style-type: none"> <li>During the vegetative or tillering stage all the stagnant water cause by uncertain floods should be drain out</li> <li>The flood water should not be allowed to submerge rice plant 5 – 6 days, so it may lead crop damage in flood prone areas</li> </ol>	<ol style="list-style-type: none"> <li>Variety China-1,HYV RC-Maniphou-4 and RC Maniphou-5 may be recommended</li> <li>During this stage water should not allowed submerged the flower part of rice otherwise all the pollen grain will wash away and it will lead chaffy grain.</li> </ol>	<ol style="list-style-type: none"> <li>Some local variety China 1 and HYV like RC Maniphou 4, RC Maniphou 5 may be grown in the low laying areas/flood prone areas. These varieties are generally sown as a direct seeded or transplanted in the month of March/April and harvested in the month of July.</li> <li>In July flood water submerge the plant up to 52 cm level, the matured panicle should be harvested and left the rice straw by cutting and by using local boats.</li> </ol>
Kharif Rice	<ol style="list-style-type: none"> <li>If the nursery sown in the month of June is damaged by flood, it may re-sown in the months of July</li> </ol>	<ol style="list-style-type: none"> <li>During the vegetative or tillering stage all the stagnant water cause by uncertain floods should be drain out.</li> <li>The flood water should</li> </ol>	<ol style="list-style-type: none"> <li>The floating rice/deep water rice variety KD14-7-9 may grown in the flood prone area</li> <li>Variety China-1,HYV RC-Maniphou-4 and RC</li> </ol>	<ol style="list-style-type: none"> <li>The harvested rice should make bundle wise and dry in the rain protected place and thresh manually as soon as possible before germination.</li> <li>Drying under direct sun with frequent over turning to bring down seed moisture level up to</li> </ol>

		not be allowed to submerge rice plant 5 – 6 days, so it may lead crop damage in flood prone areas.	Maniphou-5 may be recommended	10%.
Cucurbits	<ol style="list-style-type: none"> <li>Shift immediately to a safer place, pro-tray nursery is suggested.</li> <li>Avoid raising in open nursery field pro-tray is suggested for nursery raising</li> </ol>	<ol style="list-style-type: none"> <li>Bunds or drainage facility is made before rainy season.</li> <li>Low cost poly house is preferred, time of transplanting is change either before or after flood by using low tunnel system</li> </ol>	<ol style="list-style-type: none"> <li>Rain shelter and bunds are helpful.</li> <li>Sufficient drainage system is provided, rain shelter facility may also suggested</li> </ol>	<ol style="list-style-type: none"> <li>Mature ones and low quality crops should be harvested</li> <li>Separate ripe and unripe fruit, drying in well ventilated room and zero energy cool chamber for a week for marketing</li> </ol>
Solanaceae	<ol style="list-style-type: none"> <li>Totally avoid from flood</li> </ol>	<ol style="list-style-type: none"> <li>Drained is must, caterpillar is active in this stage, powdery mildew is increased.</li> <li>Prophylactic measures is taken up</li> </ol>	<ol style="list-style-type: none"> <li>Formation of pod is very poor during the heavy rain</li> </ol>	<ol style="list-style-type: none"> <li>Mature ones are harvested for sale</li> </ol>
Leguminosae	<ol style="list-style-type: none"> <li>Can't germinate inn such condition</li> </ol>	<ol style="list-style-type: none"> <li>If plant reaches up to 6 nodes they can't thrive for about a week, therefore use any means for drain out the field</li> </ol>	<ol style="list-style-type: none"> <li>Mature pods are harvested and immature ones are still in the plants.</li> <li>Necessary should be taken up for drained out the areas.</li> </ol>	<ol style="list-style-type: none"> <li>Mature ones are harvested for sale no pods can be harvested for seed</li> </ol>
Continuous submergence for more than 2 days				

Early Rice				
Kharif Rice				
Cucurbits				
Solanaceae				
Leguminosae				

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

Extreme event type	Suggested contingency measure			
	Seedling /nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat wave/ Cold wave/ Frost / Hailstorm / Cyclone				
Early kharif Rice	Usually nurseries are raised in Feb. - March. During this month, soil temperature is low. It/FYM/ 700 m <sup>2</sup> may be applied for proper germination and seedling growth, water should be maintained 2-3 cm	Cold and frost resistance varieties should be selected free from disease and insects. Frequent irrigation should be given to maintain water temperature this enhances vegetative growth	If the temperature is raised disease and pest population is increased so plant protection measures should be taken up	Harvest the panicle when 75% is matured
Kharif rice	Usually nurseries are raised in June. During this month, 1 t/FYM/ 700 m <sup>2</sup> may be applied for proper	Frequent irrigation should be given to maintain 5-8 cm depth. Intercultural operation should be taken up to increase the effective	If the temperature is raised disease and pest population is increased so plant protection measures should	Harvest the panicle when 75% is matured



	germination and seedling growth, water should be maintained 2-3 cm. uprooting may be done 25-30 days	tillers	be taken up	
<b>Horticulture</b>				
CUCURBITS	1. Portray is required	1. Adjust time of transplanting with low tunnel system with UV film 200micron	1. Mature fruits should be kept free from direct soil by using paddy straw	1. Harvest the fruits when fruit is soft and tender , too much mature is undesirable
SOLANACEAE	1. Avoid nursery raising in the end of March and beginning of April as cyclone and hailstorm arrives in valley districts	1. 45 to 50 days old plant can stand to some extent 2. Adjust time of transplanting	1. Wind protecting trees towards the South Western side is recommended	1. Red and green mature seeds are harvested and sorted out separately, 2. Store in the shed.

## 2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock	Suggested contingency measures		
Drought	Before the event	During the event	After the event
Feed and fodder availability	Locally available fodder	Rice bran, oil cake, rice polish, kitchen waste or garbage etc.	Mixed with fodder and cooked rice bran
	Locally available	Under ground , tube well, reservoirs etc.	Locally available
	Timely vaccination,(FMD,HS,BQ )	Sanitation and proper waste management	Scientific feed management, vaccination
<b>Flood</b>			

	Locally available fodder, storage of concentration feeds, storage of green fodder using silage	Rice bran, oil cake, rice polish, kitchen waste or garbage etc.	Mixed with fodder and cooked rice bran
	Locally available	Treated water (if possible water should be pasteurized)	Treated water (if possible water should be pasteurized)
	Timely vaccination,(FMD,HS,BQ )	Keep the safety area, Sanitation and proper waste management	Scientific feed management, vaccination
<b>Cyclone</b>			
	Locally available	Locally available	Locally available
	Locally available	Locally available if source is contaminated treat the water	Locally available
	Proper support the shed	Free from rope	Proper support the shed
<b>Heat wave and cold wave</b>			
	Stocking of charcoal, paddy husk	Burning of charcoal, burning of paddy husk, covering of animal using jute sac,	Burning of charcoal, burning of paddy husk, covering of animal using jute sac,
<b>Health and disease management</b>	Timely vaccination,(FMD,HS,BQ )	Proper feeding , sanitation	Vaccination, proper feed management

2.5.2 Poultry	Suggested contingency measures		
	Before the event	During the event	After the event
<b>Drought</b>			
Shortage of feed ingredients	Stocking of feeds	Proper feed management	Proper feed management
Drinking water	Storage of water	Hygienic water i.e, boiled water	Treated water
Health and disease management	Vaccination of F <sub>1</sub> and F <sub>2</sub>	Proper feeding , sanitation	Vaccination, proper feed management
<b>Flood</b>			
Shortage of feed ingredients	Storage of concentration feeds, storage of grain (maize, rice bran)	Rice bran, rice polish, maize	Mixed with concentrated rice bran
Drinking water	Locally available	Treated water (if possible water should be pasteurized)	Treated water (if possible water should be pasteurized)
Health and disease management	Timely vaccination,(antibiotics )	Sanitation, proper waste management and vit. B-complex Ca and minerals	Scientific feed management, vaccination
<b>Cyclone</b>			
Shortage of feed ingredients	Stocking of feeds	Proper feed management	Proper feed management
Drinking water	Locally available, Treated water	Treated water (if possible water should be pasteurized)	Treated water (if possible water should be pasteurized)
Health and disease management	Proper shed management	Sanitation, proper waste management and vit. B-complex Ca and minerals	Sanitation, proper waste management and vit. B-complex Ca and minerals
<b>Heat wave and cold wave</b>			
Shelter /environment management	Proper shed management	Burning of charcoal, burning of paddy	Proper shed management

		husk,	
Health and disease management	Vaccination of F <sub>1</sub> and F <sub>2</sub>	Sanitation, proper ventilation	Sanitation, proper ventilation

2.5.3 Fisheries / Aquaculture	Suggested contingency measures		
1. Drought	Before the event	During the event	After the event
<b>A. Capture</b>			
<b>Marine</b>	NA	NA	NA
<b>Inland</b>			
(i) Shallow water depth due to insufficient rains/ inflow	<ol style="list-style-type: none"> <li>10% of the total area should be created into deep pool/channels in selected area of the water (to ensure 1.25 m depth of water)</li> <li>Partial harvesting of fish</li> </ol>	Pooling the existing fish stocks should be done	<ol style="list-style-type: none"> <li>Aquatic weeds and unwanted animals should be removed</li> <li>Lime/ash should be applied @ 200 kg to 300 kg/ha to correct the soil P<sup>H</sup> and disinfect the area</li> </ol>
(ii) Changes in water quality	-	-	-
(iii) Any other	-	-	-
<b>B. Aquaculture</b>			
(i) Shallow water in ponds due to insufficient rains/ inflow	<ol style="list-style-type: none"> <li>To create a constant water source to supply water to fish ponds, eg. Tube well</li> </ol>	<ol style="list-style-type: none"> <li>Partial harvesting of fish</li> <li>Transfer all the existing fishes to the deeper</li> </ol>	<ol style="list-style-type: none"> <li>Disinfectant of all ponds by applying lime @ 200-300 kg/ha.</li> <li>Clean all the unwanted aquatic</li> </ol>

	2. Deepening of ponds at least 1 meter during the event	ponds having enough water	weeds and predators to culture fishes
(ii) Impact of salt load build up in ponds/ change in water quality	-	-	-
(iii) Any other	-	-	-

2.5.3 Fisheries	Suggested contingency measures		
	Before the event	During the event	After the event
<b>2. Floods</b>			
<b>A. Capture</b>			
<b>Marine</b>	NA	NA	NA
<b>Inland</b>			
(i) Average compensation paid due to loss of human life	-	-	-
(ii) No. of boats/ nets/ damaged	-	-	-
(iii) No. of houses damaged	-	-	-
(iv) Loss of stock	-	-	-
(v) Changes in water quality	-	-	-

(vi) Health and diseases	-	-	-
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2.5.3 Fisheries	Suggested contingency measures		
	Before the event	During the event	After the event
<b>2. Floods</b>			
<b>B. Aquaculture</b>	<ol style="list-style-type: none"> <li>1. Construction of ring bund/embankment of fish farm. The height of the bund should have 0.5 – 1.0 m higher than the highest flood level(data should be taken 10 yrs.)</li> <li>2. Provide proper drainage system in order to prevent inflow and outflow of pond water</li> <li>3. Health check and any incidence diseases should be done and isolate the pond, fish is transferred to the quarantine pond</li> </ol>	Encircle the pond /farm areas with proper nylon nets in order to prevent escape of fish from ponds/ farms during flood.	<ol style="list-style-type: none"> <li>1. Aquatic weed should be cleaned and controlled by using suitable methods</li> <li>2. Liming should be done to get pond water near neutrality(P<sup>H</sup> 6.5-7.5)</li> <li>3. Change pond water to fresh water</li> </ol>
(i) Inundation with flood water	-	-	-
(ii) Water continuation and changes in water quality	-	-	-
(iii) Health and diseases	To ensure enough fresh water	To ensure enough fresh water	Liming @ 200-300 kg/ha.
(iv) Loss of stock and inputs (feed, chemicals etc)	-	-	-

(v) Infrastructure damage (pumps, aerators, huts etc)	-	-	-
(vi) Any other	-	-	-

<b>2.5.3 Fisheries</b>	<b>Suggested contingency measures</b>		
3. Cyclone / Tsunami	Before the event	During the event	After the event
<b>A. Capture</b>			
<b>Marine</b>	-	-	-
(i) Average compensation paid due to loss of fishermen lives	-	-	-
(ii) Avg no of boats/ nets damaged	-	-	-
(iii) Avg no of houses damaged	-	-	-
<b>Inland</b>	-	-	-
<b>B. Aquaculture</b>	-	-	-
(i) Overflow / flooding of ponds	-	-	-
(ii) Changes in water quality (fresh water/ brakish water ratio)	-	-	-

(iii) Health and diseases	-	-	-
(iv) Loss of stock and inputs (feed, chemicals etc)	-	-	-
(v) Infrastructure damage (pumps, aerators, shelters/ huts etc)	-	-	-
(vi) Any other	-	-	-

<b>2.5.3 Fisheries</b>	<b>Suggested contingency measures</b>		
4. Heat wave and cold wave	Before the event	During the event	After the event
A. Capture	-	-	-
Marine	-	-	-
Inland	-	-	-
B. Aquaculture	-	-	-
(i) Changes in pond environment (water quality)	-	-	-



(ii) Health and Disease management	-	-	-
(iii) Any other	-	-	-

Thank You