State: MEGHALAYA

Agriculture Contingency Plan for District: West Khasi Hills

1.0 District Agriculture profile*				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Warm per humid Eco Region D2A9 (17.1)		
	Agro-Climatic Zone (Planning Commission)	Eastern Himalayan Region (Temperate sub-alpine and mid tropical hill zone)		
	Agro Climatic Zone (NARP)	Sub Topical Hill Zone (NEH-5)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	East Khasi hills, West Khasi Hills, Jaintia hills ,East Garo Hills, West Garo Hills, South Garo Hills, Ri Bhoi		
	Geographic coordinates of district headquarters	**Latitude**	**Longitude**	**Altitude**
		25 10' and 25 51' N	90 44' and 91 49' E	1409
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ICAR Research Complex for NEH region ,Umiam Road,Umiam-793103 (Meghalaya)		
	Mention the KVK located in the district with full address	KVK, West Khasi Hills Nongshillong,PO: Nongstoin ,Meghalaya 793119		
	Name and address of the nearest Agro met Field Unit (AMFU, IMD) for agro-advisories in the Zone	Indian Metereorological Department, 3rd Mile, Upper Shillong-793005		

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):	2370.32	75	2nd week of June	2nd week of October
	NE Monsoon(Oct-Dec):	228.62	35	3rd week of Oct	1st week of Dec
	Winter (Jan- February)	49.40	10	2nd week of Jan	3rd week of Feb
	Summer (March-May)	625.24	40	2nd week of April	3rd week of May
	Annual	3273.26	160	-	-

Source: Directorate of Agriculture,Meghalaya,Shillong, {Average rainfall of 5 yrs (2009-2013)}

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)	52.5	36.7	20.7	7.4	NA	14.5	4.4	4.9	1.9	4.8

1.4 SOIL TYPES AND INTERPRETIVE GROUPINGS OF SOILS OF WEST KHASI HILL (INCLUDING SOUTHWEST KHASI HILLS DISRICT)

Sl. no.	**Soil classifications**	**Series**	**Physiographic situation**	**Elevation Mts. above MSL**	**Soil depth**	**Land capability subclasses**	**Irrigability**	**Productivity potential**	**Suggested land-uses.**	**Area in Ha**	**Mapping units*/ (locations)**
a) Warm per-humid Agro-Eco Sub Region with thermic temperature regime											
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	Fine loamy, mixed, thermic Typic Humaquepts	Laitdom	Inter hill valleys	1625	Very deep	IVw	Moderately suitable	Medium	Paddy, vegetables	14312	(Mairang)
2	Coarse loamy, mixed, thermic Typic Udorthents	Langkyrdem	Escarpment (steeply sloping 30-50%)	1500	Moderately deep	VIIes	Not suitable	Medium	Vegetative cover	23399	07
2	Fine, mixed, thermic Typic Haplohumults	Mairang	Side hill slopes (moderate8-15%)	1600	Very deep	IIIe	Marginally suitable	Medium	Forest plantations	21469	02 (Mairang)
4	Coarse loamy, mixed, thermic Typic Dystrudepts	Mawlein	Upper hill slopes (moderate)	1500	Moderately deep	IIIes	Marginally suitable	Low	Forest plantations	25527	(Marshillong Mawkyrwat)
5	Loamy skeletal mixed, therimic, Typic Dystrudepts	Nongspung	Hill slopes (moderate)	1450	Moderately deep	VIIs	Moderately suitable	Low	Forest plantations	48730	3, 4, 8. (Nongspung)

6	Fine, mixed thermic Typic Kandihumults	Nongstoin	Hill slopes (moderate)	1250	Deep to very deep	IIIe	Marginally	Medium	Forest , horticultural with erosion control	80166	03, 04, 05. (Nongstoin)
7	Coarse loamy, mixed thermic Humic Dystrudepts	Syntein	Escarpment (steep slopes)	1600	Moderately deep	VIIIe	Not suitable	Low	Forest, grass cover, erosion control.	35099	07 (Nongnah)
9	Fine, mixed, thermic, Typic Kandiudults	Umkrem	Hill slopes (moderate 8-15%)	1145	Deep to very deep	IIIes	Marginally suitable	Medium	Forest, horticultural with erosion control	38291	01
10	Fine loamy, mixed thermic, Typic Dystrudtpts	Umthlu	Gently sloping hill top (gently sloping 1 – 3 %)	750	Deep to very deep	Vis	Not suitable	Medium	Forest plantations		05
b) Warm per-humid Agro-Eco Sub region with hyperthermic temperature regime.											
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
11	Fine, mixed, hyperthermic Aeric Endoaquepts	Ramjongiri	Valley	100	Deep	IVw	Moderately suitable	Medium	Paddy, vegetables	9488	18
12	Loamy skeletal, mixed, hyperthermic Humic Dyrtrudepts	Baghmara, mawshun	Hill slope (moderately steep 30-50%)	350	Deep	VIIes	Not suitable	Medium	Forests, plantations with erosion checks	26215	11, 20.
13	Fine loamy, mixed, hyperthermic Humic Dystrudepts	Bajenngdoba	Undulating upland (moderately sloping 8-15%)	70	Deep	IIIe	Marginally suitable	Medium	Horticultural with erosion checks	19955	09, 10.
14	Fine, mixed, hyperthermic	Dewankata	Piedmond plains(level)	75	Deep	IVw	Moderately suitable	Medium	Paddy, pulses,	14231	16, 18

	Typic Endoaquepts								vegetables		
15	Coarse loamy, mixed, hyperthermic Typic Udorthents	Tura peak	Side hill slope (moderate 15 - 30 %)	1180	Moderately deep	VIs	Not suitable	Low	Vegetative cover for erosion control.	27606	22, 23
16	Fine, mixed, hyperthermic, Humic Dystrudepts	Mynkre	Hill slope (moderate slope)	700	Dee	VIIs	Not suitable	Low	Vegetative cover to control erosion	2532	19
17	Fine, mixed hyperthermic Cumulic Humaquepts	Mawshynrut	Inter hill vlley (nearly level)	1300	Deep	IVw	Moderately suitable	Medium	Paddy, pulses, vegetables	5653	17
18	Fine, mixed, hyperthermic Typic Kandihumults	Nongenram	Hill slope (moderately steep 15-30%)	550	Deep	IVe	Not suitable at present	Medium	Forest, horticultural with erosion control	23167	11,12.
18	Fine, mixed, hyperthermic Typic Kandihumults	Nongpoh	Hill slopes (moderately steep 15 – 30%)	550	Very deep	IIes	Moderately suitable	Medium	Maize, pulses, horticultural with erosion check	17567	13, 21.
20	Fine loamy mixed hyperthermic Humic Dystrudepts	Pathatklinang	Valley (gently sloping 1 – 3 %)	775	Very deep	IVs	Moderately suitable	Medium	Cereals, pulses vegetables.	8479	17, 24.
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
21	Coarse loamy, mixed, hyperthermic Humic Dustrudepts	Mawshun	Escarpment (steeply sloping)	400	Deep	VIIes	Not suitable	Low	Afforestation,	6915	20
22	Coarse loamy, mixed, hyperthermic Ultic	Rongram	Side hill slope (steeply sloping 30-50 %)	500	Deep	VIIes	Not suitable	Medium	Forest plantations	20865	21

	Hapludalfs										
23	Clayey skeletal, mixed hyperthermic Typic Kanhapludults	Gangganggiri	Undulating hills (moderately sloping 8-15%)	275	Deep	VIs	Not suitable	Low	Forest	4590	22
24	Fine, mixed, hyperthermic Typic Kandihumults	Umsooing (Umsning)	Hill slopes (moderately sloping 15-30 %)	950	Deep to very deep	IIIes	Marginally suitable	Medium	Upland agricultural & horticultural with erosion control	7412	10

**Mapping units - Soil resource map of Meghalaya, NBSS& LUP PUBLICATIONS.,*

EXPLANATION OF PARAMETERS:

LAND CAPABILITY

a. CLASS

I	Arable uses, slight or no limitations
II	Arable uses, moderate limitations
III	Arable uses, severe limitations
IV	Arable uses, very severe limitations
V	Non arable uses, slight limitations
VI	Non arable uses, moderate limitations
VII & VIII	Non arable uses very severe limitations

b. SUB CLASS (limitations)

e	Erosion, loss of top soil, slope gradient
s	Soil depth, root penetration/drainage/salinity/sodicity
t	Topography, landform, landscape

Source : District and local research station&lab.Shillong

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	30.917	121.81
	Area sown more than once	6.772	
	Gross cropped area	37.689	

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	1924.02		
	Gross irrigated area	3994.03		
	Rain fed area	1142.53		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area(Area may be indicated)
	Canal	NA		
	Tanks	-	-	-
	Open wells	-	-	-
	Bore wells	-	-	-
	Lift irrigation schemes	-	-	-
	Micro-irrigation	-	-	-
	Total Irrigated Area	-	-	-
	Power tiller under State Plan Scheme	-	-	-
	Power tiller under Centrally Sponsored Scheme	-	-	-
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited	-	-	-
	Critical	-	-	-
	Semi- critical	-	-	-
	Safe	-	-	
	Wastewater availability and use	-	-	-
	Ground water quality	Good fit for drinking		
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

Source: **Central Ground Water Board North Eastern Region**

1.6. a.	**Fertilizer and Pesticides use**	Type	Total quantity (tones)
1	Fertilizers*	Urea DAP Potash SSP Other straight fertilizers (specify) Other complex fertilizers (specify)	54.33MT 6.55MT 0.900MT - - -
2	Chemical Pesticides*	Insecticides 1) Chlorpyriphos 2) Fenvarelate 3) Carbofuran	 Not Availalable
3	Fungicides	Carbendazim Biopesticide Sticker Rodenticides (Zinc Phosphide)	Not Available

Source: Directorate of Economics and Statistics, District Statistical Handbook,WKH 2010

1.7 Area under major field crops & horticulture (as per latest figures)

1.7	S. No.	Major field crops cultivated	Area ('000 ha)							
			Kharif			*Rabi*				
			Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	1.	Rice	-	7763	7763	52	-		-	7815
	2.	Maize	-	4255	4255	-	-	-	-	4225
	3.	Soybean	-	25	25	-	-	-	-	25
	4.	Millets	-	-	-	232			-	232
	5.	Rabi pulses	-	-	-	-		-	-	
		Pea	-	-	-	28				
		Cowpea	-	-	-	5				33
	6.	Sesame	-	-	-	28		-	-	28
	7.	Rape & Mustard	-	-	-	28		-	-	28
	8.	Tobacco	-	-	-	32		-	-	32

Sl. No.	**Horticulture crops - Fruits**	**Area ('000 ha)**		
		Total	**Irrigated**	**Rainfed**
1	Pineapple	727	-	**727**
2	Citrus fruits	1169	-	**1169**
3	Banana	785	-	**785**
4	Papaya	39	-	**39**
	Horticulture crops	**Total**	**Irrigated**	**Rainfed**
1	Potato	5437	-	**5437**
2	Sweet potato	1319	-	**1319**
3	Ginger	332	-	**332**
	Tapioca	649	-	**649**
4	Black Pepper	102	-	**102**
5	Chillies	47	-	**47**
6	Turmeric	70	-	**70**
7	Arecanut	1224	-	**1224**

Source: (2011-12) Directorate of Agriculture, Meghalaya, Shillong

1.8 **Live Stock**

1.8	**Livestock**	**Male ('000)**		**Female ('000)**		**Total population ('000)**
	1. Cattle:					
	Crossbred	0.160		0.342		**0.502**
	Indigenous	31.597		63.553		**95.15**
	2. Buffaloes : Crossbred	4.092		1.757		**5.85**
	3. Goat	14.190		28.187		**42.377**
	4. Sheep	1.191		1.810		**3.001**
	5. Pigs:					14.279
	Crossbred	6.079		8.200		
	Indigenous	22.581		20.715		43.296
	6. Rabbits	0.015		0.017		**0.032**
	7. Hens and ducks :	cock	duck	hen	drakes	
	Desi	168.654	0.045	202.400	0.052	**468.054**
	Improved	7.552	0.025	10.605	0.016	**18.198**
	Yak	-		-		-
	Others (Horse, mule, donkey etc., specify)	0.732		0.410		1.142
	Commercial dairy farms (Number)	-		-		-
1.9	**Poultry**	**No. of farms**		**Total No. of birds ('000)**		
	Government Poultry Farm	13		**319000=319.00**		
	Private Farms, Individual rearers #	-				

Source: Source: (2011, 19th Livestock census) Directorate of Animal Husbandry & Veterinary, Meghalaya.

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**	

	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)			
	Others	-	-	-

1.11 Production and Productivity of major crops (Average of last 5 years: 2008, 09, 10, 11, 12)

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 to be identified based on total acreage)										
Crop 1	Rice	11380	1466	108	2069	-	-	**11488**	**1470**	0.310
Crop 2	Maize	4863	1143	-	-	-	-	**4863**	**1143**	0.114
Crop 3	Rabi pulses	-	-	44	1333	-	-	**44**	**1333**	0.199
Crop 4	Millets	-	-	234	1009	-	-	**234**	**1009**	0.151
Crop 5	Soybean	-	-	26	1040	-	-	**26**	**1040**	0.156
Crop 6	Sesame	-	-	20	714	-	-	**20**	**714**	0.071
Crop 7	Rapeseed	-	-	19	649	-	-	**19**	**649**	0.065
Crop 8	Tobacco	-	-	36	1125	-	-	**36**	**1125**	0.113
Major Horticultural crops (Crops to be identified based on total acreage)										
Crop 1	Potato	-	-	45325	8282	-	-	**45325**	**8282**	-

Crop 2	Citrus fruits	-	-	4933	4234	-	-	**4933**	**4234**	-
Crop 3	Banana	4244	5406	-	-	-	-	**4244**	**5406**	1.27
Crop 4	Pineapple	4131	5682	-	-	-	-	**4131**	**5682**	-
Crop 5	Papaya	177	4538	-	-	-	-	**177**	**4538**	-
Crop 6	Arecanut	-	-	1165	952	-	-	**1165**	**952**	-
Crop 7	Ginger	2007	6045	-	-	-	-	**2007**	**6045**	-
Crop 8	Sweet potato	3916	2969	-	-	-	-	**3916**	**2969**	0.594
Crop 9	Tapioca	3583	5521	-	-	-	-	**3583**	**5521**	-
Crop 10	Turmeric	-	-	275	3929	-	-	**275**	**3929**	-
Crop 11	Chillies	-	-	45	957	-	-	**45**	**957**	-
Crop 12	Black pepper	-	-	-	-	-	-	**66**	**645**	-
Crop 13	Tea	-	-	-	-	-	-	-	-	-

Source: (2012-13) Directorate of Agriculture, Meghalaya, Shillong.

1.12	Sowing window for 5 major field crops	Rice			Maize		3: Rabi pulses	4: Millets	5: Soyabean
		High altitude	Mid altitude	Lower altitude	High altitude	Mid & Lower altitude			
	Kharif-Rainfed upland	Mid April - 1st week of May	Last week of April April to 1st week of July	June to 1st week of July	Mid March –mid April	April - May		1st week of April - 3rd week of May	May –June
	Kharif-Irrigated								
	Rabi-Rainfed		-		1st week Oct - 1st week of Nov till March 2nd wk – april 2nd wk		2st week Oct - 1st week of Nov	1st week Oct - 1st week of Nov	
	Rabi-Irrigated					Oct to Nov			
	Summer-irrigated								
	Summer-rainfed								1st week of June- 1st week of july

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			√

	Snowfall			√
	Landslides		√	
	Earthquake		√	
	Pests and disease outbreak (specify) :		√	
	Others (like fog, cloud bursting etc.)		√	

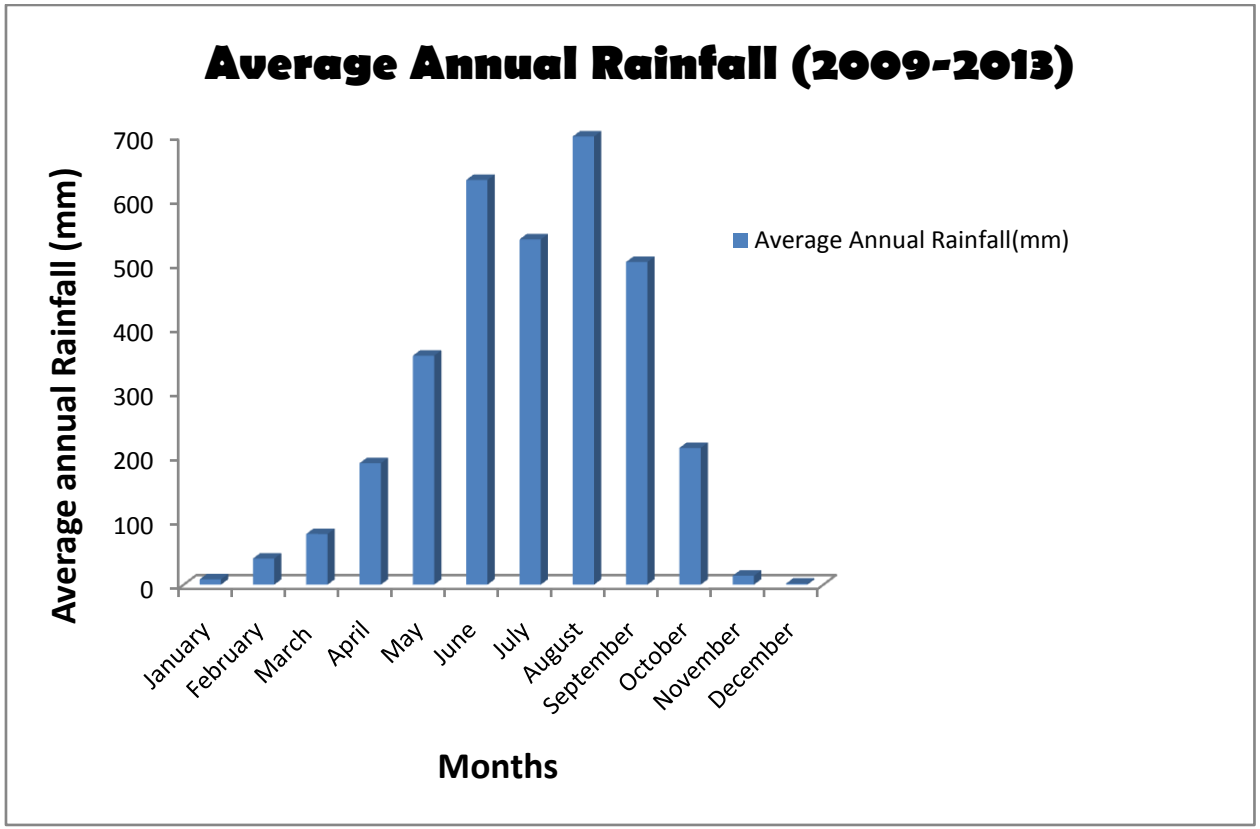
*When contingency occurs in six out of 10 years

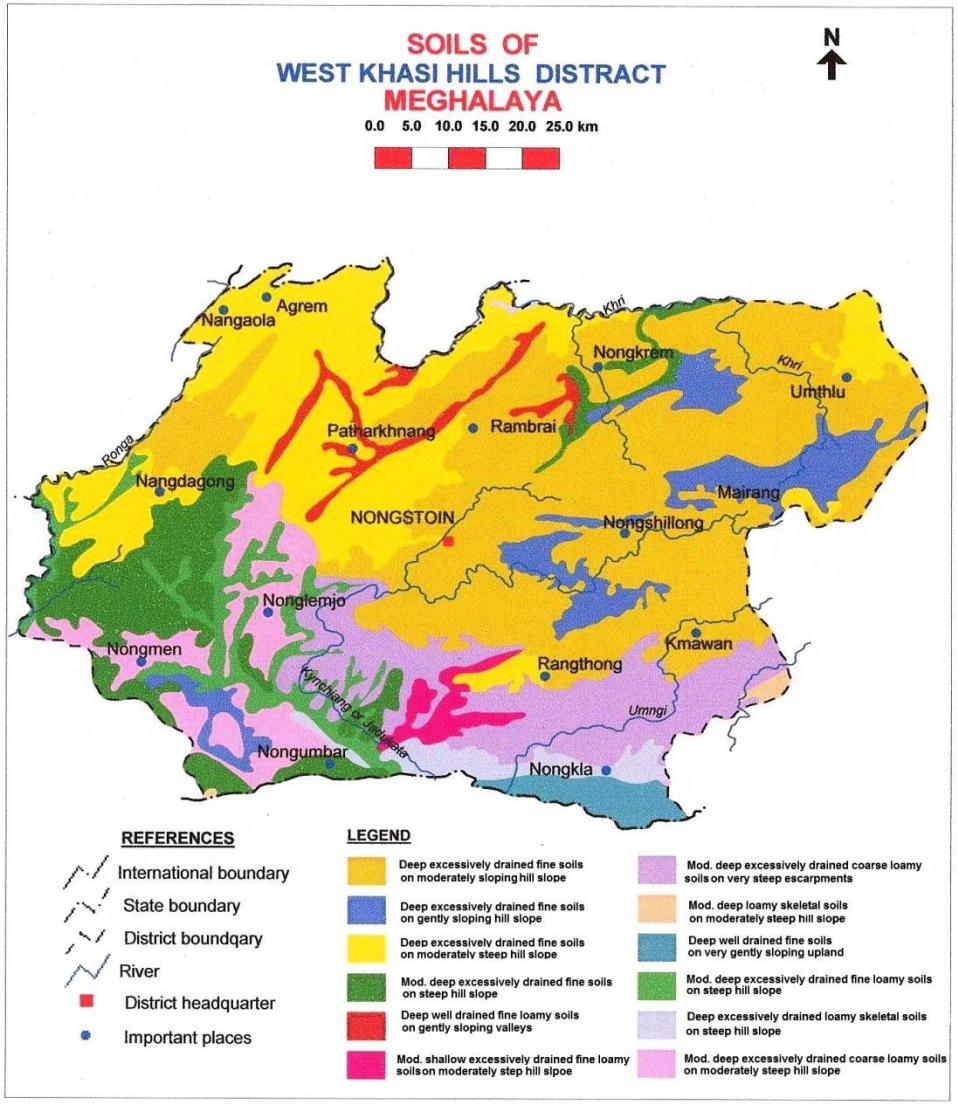
1.14	**Include Digital maps of the district for**	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map : Not Available	Enclosed: Yes

Location map of West Khasi Hills district

Annexure I

Annexure 2 : Average Annual Rainfal l data for West Khasi Hills(mm)




SOILS OF
WEST KHASI HILLS DISTRACT
MEGHALAYA
0.0 5.0 10.0 15.0 20.0 25.0 km
N
Agrem
Nangaola
Khri
Nongkrem
Khri
Umthlu
Pathrkhnang
Rambrai
Ronga
Nangdagong
NONGSTOIN
Mairang
Nongshillong
Nonglemjo
Nongmen
Kmawan
Rangthong
Umngi
Nongumbar
Nongkla
REFERENCES
International boundary
State boundary
District boundqary
River
District headquarter
Important places
LEGEND
Deep excessively drained fine soils on moderately sloping hill slope
Deep excessively drained fine soils on gently sloping hill slope
Deep excessively drained fine soils on moderately steep hill slope
Mod. deep excessively drained fine soils on steep hill slope
Deep well drained fine loamy soils on gently sloping valleys
Mod. shallow excessively drained fine loamy soils on moderately step hill slpoe
Mod. deep excessively drained coarse loamy soils on very steep escarpments
Mod. deep loamy skeletal soils on moderately steep hill slope
Deep well drained fine soils on very gently sloping upland
Mod. deep excessively drained fine loamy soils on steep hill slope
Deep excessively drained loamy skeletal soils on steep hill slope
Mod. deep excessively drained coarse loamy soils on moderately steep hill slope

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation (*maintain separate rows for each cropping system*)

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 (June 4th week)*	1) **Farming situation:** Rainfed	Rice	No change	Normal agronomic measures Shift from long duration to short duration crops/varieties More area put under nursery. Spray of B and K increases drought tolerance.	
		Maize based Cropping System a. Maize + Finger Millet (intercropping, Higher Altitude) b. Blackgram (after maize, lower elevation) c. Maize + Soybean (intercropping, higher elevation) d. Maize + Ginger (Mid altitude region) e. Maize + Vegetables f. Rabi Maize + Vegetables/ Mustard/Toria g. Maize + Potato/ Vegetables h. Maize + Topoica	No change	Delay the seedling raising of finger millet Wider spacing (60 X 30) cm for maize Frequent interculture operation for conservation of moisture Mulching in ginger Management of soil acidity Solanaceous crops should be planted in well drained, slightly sloppy land	
	1) **Farming situation:**	Potato/ turnip/beetroot/tomato/carrot/cauliflowe	No change	Recommended package of practices	

	Rainfed upland - (Sandy loam to clay loam)	r/onion/peas/lettuce/cabbage/brocolli			
		Chilli/turmeric/ginger/pumpkin/radish/frenchbean/cucumber/ bitter gourd/ brinjal /Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/brocolli	No change	Recommended package of practices	
	2) Farming situation: Rainfed medium land/medium low land (Sandy loam to clay loam)	Potato/ turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/brocolli	No change	Recommended package of practices	
Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks (July 2nd week)	1) **Farming situation:** Rainfed	Cropping system 1: Rice	Follow water conservation and management practices. At higher altitude rice will be replaced by other vegetable crops such as cabbage or Possibility of taking a catch crop Conserving moisture for 'rabi' sowing Utilizing paddy fallows for	Use of short duration variety which are tolerant to drought Seeds should be sown in nursery SRI method can be followed during drought at lower /mid altitudes	

			second crop		
		Cropping system 2: Maize Maize + Finger Millet (intercropping, Higher Altitude) Maize + Soyabean (intercropping, higher elevation) d. Maize + Ginger (Mid altitude region) e. Maize + Vegetables f. Rabi Maize + Vegetables/ Mustard/Toria g. Maize + Potato/ Vegetables	Finger millet : Indaf- 5, 8, 9, local Maize :local yellow,local white, HQPM-1,DA61A Vivek- 15, Vivek -9, Vivek-23 Soybean: Bragg,Hill, PK-1042, 1024, PK-262, local (black bold) , VL-soya-47 Ginger : Nadia. Topoica : Local Horticultural crops Potato: Kufri Jyoti, K. Giriraj, K. Megha	Delay the seedling raising of finger millet Wider spacing (60 X 30) cm for maize Frequent interculture operation for conservation of moisture Mulching in ginger Management of soil acidity Timely thinning to maintain proper spacing	
	Rainfed 1) **Farming situation:** Rainfed upland - (Sandy loam to clay loam)	Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/brocolli Chilli/turmeric/ginger/pumpkin/radish/frenchbean/cucumber/ bitter gourd/ brinjal/Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/brocolli	No change No change	Recommended package of practices Recommended package of practices	
	2) Farming situation: Rainfed medium land/medium low land (Sandy loam to clay loam)	Potato/ turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/brocolli	No change	Recommended package of practices	

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks (july 4th week)	1) **Farming situation:** *Rainfed	Cropping system 1:Rice	Follow water conservation and management practices. Possibility of taking a catch crop Conserving moisture for 'rabi' sowing Utilizing paddy fallows for second crop.	Use of short duration variety which are tolerant to drought Seeds should be sown in nursery SRI method can be followed during drought at lower altitudes Transplanting of rice should be completed by mid july	
		Cropping system 2: Maize based : Maize + Finger Millet (intercropping, Higher Altitude) Maize + Soyabean (intercropping, higher elevation) Maize + Ginger (Mid altitude region) Maize + Vegetables Rabi Maize + Vegetables/ Mustard/Toria Maize + Potato/ Vegetables	Finger millet : Indaf- 5, 8, 9, local Maize :local yellow,local white, HQPM-1,DA61A Vivek- 15, Vivek -9, Vivek-23 Soybean: Bragg,Hill, PK-1042, 1024, PK-262, local (black bold) , VL-soya-47 Ginger : Nadia. Topoica : Local Horticultural crops Potato: Kufri Jyoti, K. Giriraj, K. Megha	Mulching in ginger Wider spacing (60 X 30) cm for maize Frequent interculture operation for conservation of moisture Selection of short duration varieties (80-90) days Management of soil acidity Timely thinning to maintain proper spacing Mulching of crops with green leaves Solanaceous crops should be planted in well drained, slightly sloppy land.	
	1) **Farming situation:**		Short Duration Varieties	Recommended package of practice	
		Potato/turnip/beetroot/tomato/carr	No change		

	Rainfed upland - (Sandy loam to clay loam)	ot/cauliflower/onion/peas/lettuce/cabbage/brocolli			
		Chilli/turmeric/ginger/pumpkin/radish/frenchbean/cucumber/ bitter gourd/ brinjal/Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/brocolli	No change	Recommended package of practice	
	2) Farming situation: Rainfed medium land/medium low land (Sandy loam to clay loam)	Potato/ turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/ brocolli	No change	Recommended package of practice	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks (Aug 2nd week))	1) **Farming situation:** Rainfed	Cropping system 1:Rice	Follow water conservation and management practices. *Possibility of taking a catch crop *Conserving moisture for 'rabi' sowing *Utilizing paddy fallows for second crop.	Use of short duration variety which are tolerant to drought Seeds should be sown in nursery SRI method can be followed during drought at lower altitudes	
		Cropping system 2:Maize based Maize + Finger Millet (intercropping, Higher Altitude)	Finger millet : Indaf- 5, 8, 9, local Maize :local yellow,local white, HQPM-1,DA61A	Mulching in ginger Wider spacing (60 X 30) cm for maize	

		Maize + Soyabean (intercropping, higher elevation) Maize + Ginger (Mid altitude region) Maize + Vegetables Rabi Maize + Vegetables/ Mustard/Toria Maize + Potato/ Vegetables	Vivek- 15, Vivek -9, Vivek-23 Soybean: Bragg,Hill, PK-1042, 1024, PK-262, local (black bold) , VL-soya-47 Ginger : Nadia. Topoica : Local Horticultural crops Potato: Kufri Jyoti, K. Giriraj, K. Megha	Frequent interculture operation for conservation of moisture Selection of short duration varieties (80-90) days Management of soil acidity Intercropping of pulses with maize Timely thinning to maintain proper spacing Mulching of crops with green leaves	
	1) **Farming situation:** Rainfed upland - (Sandy loam to clay loam)	Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/brocolli	No change	Recommended package of practices	
		Chilli/turmeric/ginger/pumpkin/radish/frenchbean/cucumber/ bitter gourd/ brinjal/Potato//turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/brocolli	No change	Recommended package of practices	
	2) Farming situation: Rainfed medium land/medium low land	Potato/ turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/ brocolli	No change	Recommended package of practices	

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	1) **Farming situation :** Rainfed	**1. Rice** **2. Rice based :** Rice -Mustard/Vegetables	No change	Choice of crops and varieties for late sowing Follow water conservation and management practices. Possibility of taking a catch crop Conserving moisture for 'rabi' sowing Utilizing paddy fallows for second crop	
		Maize based cropping system : Maize - rice/soybean - potato/vegetables/ wheat/mustard Maize - Maize + French Beans(Local)/vegetables Ginger + Maize Maize - Finger Millet/ Rice Bean(Relay) + vegetable Ginger Turmeric	Maize: HQPM-I, RCM 1- 1, RCM 1-2. Rice: Shah Sarang-1, RCPL,megha rice 1	Mulching with green/dry leaves & grasses Wider spacing (60 X 30cm) for maize Furrow application of FYM Frequent intercultural operation for moisture conservation	
	1) **Farming situation :** Rainfed upland Sandy loam to clay loam)	Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/ cabbage/brocolli	No change	-Life saving supplemental irrigation -Weeding and thinning at critical stages of growth. -Application of sufficient quantity of FYM or compost in the main field.	Water harvesting structures
		Chilli/turmeric/ginger/pumpkin/radish/frenchbean/cucumber/ bitter gourd/ brinjal//Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/cabbage/brocolli	No change	-Life saving supplemental irrigation -Weeding at critical stages of growth. - Application of sufficient quantity of FYM or compost in the main field	-do-

	Rainfed medium land/ medium low land (Sandy loam to clay loam)	Potato/ turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/ cabbage/brocolli	No change	Supplemental irrigation in the nursery bed of rice. -Application of sufficient quantity of FYM or compost in the nursery bed and main field.	-do-

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Rainfed : with moderate to high rainfall and no irrigation facilities	Cropping system 1:Rice	No change	Nursery raising of seedling Weeding at regular intervals Wider spacing	
		Cropping system 2:Maize based Maize + Finger Millet (intercropping, Higher Altitude) Maize + Soyabean (intercropping, higher elevation) Maize + Ginger (Mid altitude region) Maize + Vegetables Rabi Maize + Vegetables/ Mustard/Toria Maize + Potato/ Vegetables	Thinning to maintain optimum plant population. Life saving irrigation by using water of Dug-out ponds and rain water harvesting structure. Weeding and weed mulching.	FYM Mulching with green/dry leaves & grasses Wider spacing (60 X 30) cm for maize, followed with intercropping In-situ soil moisture conservation measures Frequent intercultural operation for moisture conservation	

	1) **Farming situation:** Rainfed upland (Sandy loam to clay loam)	Chilli/turmeric/ginger/pumpkin/radish/frenchbean/cucumber/ bitter gourd/ brinjal/Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/ cabbage/brocolli	No change	Life saving supplemental irrigation -Weeding at critical stages of growth. -Application of sufficient quantity of FYM or compost in the main field.	
		Chilli/turmeric/ginger/pumpkin/radish/frenchbean/cucumber/ bitter gourd/ brinjal/Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/ cabbage/brocolli		-Life saving supplemental irrigation -Weeding at critical stages of growth. - Application of sufficient quantity of FYM or compost in the main field - Thinning to maintain optimum plant population.	
	2) Farming situation: Rainfed medium land/medium low land (Sandy loam to clay loam)	Potato/ turnip/beetroot/tomato/carrot/cauliflower /onion/peas/lettuce/ cabbage/ brocolli	No change	Gap filling if required Life saving supplemental irrigation at critical stages of crop growth	

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		Cropping system 1:Rice	Need based plant protection measures should be followed Spray of antitranspirants Moisture conservation practices such as ridging and mulching can be followed	Weeding should be done at regular interval water harvesting structures can be constructed so as to provide	

				irrigation during the critical stages	
		Cropping system 2:Maize based Maize + Finger Millet (intercropping, Higher Altitude) Maize + Soyabean (intercropping, higher elevation) Maize + Ginger (Mid altitude region) Maize + Vegetables Rabi Maize + Vegetables/ Mustard/Toria Maize + Potato/ Vegetables	Thinning to maintain optimum plant population. Life saving irrigation by using water of Dug-out ponds and rain water harvesting structure. Weeding and weed mulching.	FYM Mulching with green/dry leaves & grasses Wider spacing (60 X 30) cm for maize, followed with intercropping In-situ soil moisture conservation measures Frequent intercultural operation for moisture conservation	
	Rainfed upland (Sandy	Potato// turnip/beetroot/tomato/carrot/cauliflower /onion/peas/lettuce/ cabbage/ brocolli	No change	-Life saving supplemental irrigation	- Water harvesting structures
		Chilli/turmeric/ginger/pumpkin/radish/frenchbean/cucumber/ bitter gourd/ brinjal/Potato///turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/ cabbage/ brocolli	No change	Life saving supplemental irrigation -Weeding at critical stages of growth. - Thinning to maintain optimum population. Mulching with crop residues	
	Rainfed medium land/	Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/ cabbage/ brocolli	No change	-Life saving supplemental irrigation at critical	

	Mediu m low land (Sandy loam to clay loam)			stages of crop growth	

Condition			**Suggested Contingency measures**		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	1) **Farming situation:** Rainfed	Cropping system 1: rice Rice based Rice - Mustard/Vegetables	Follow water conservation and management practices. Efficient use of stored water for life saving irrigation Short duration varieties of pulses, oilseeds, minor millets Harvesting the crop at physiological maturity. Prepare for the ensuing 'rabi' season.	Water harvesting structures for irrigating rabi crops	
		Cropping system 2: Maize based cropping system : 1. Maize - rice/soybean - potato/vegetables/ wheat/mustard 2. Maize - Maize + French Beans(Local)/vegetables 3. Ginger + Maize 4. Maize - Finger Millet/ Rice Bean (Relay) + vegetable Ginger Turmeric	Maize: HQPM-I, RCM 1- 1, RCM 1-2, Soybean: Ahilya-1,bragg,hill.	Conservation measures Furrow application of FYM Mulching with green/dry leaves & grasses Wider spacing (60 X 30 cm) for maize Frequent intercultural operation for moisture conservation	

	1) **Farming situation:** Rainfed upland (Sandy loam to clay loam	Potato/turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/ cabbage/ brocolli	Life saving supplemental irrigation - Pre-sowing irrigation for nursery raising and life saving irrigation after transplanting	- Growing of Tomato, Brinjal, and Leafy vegetables like Spinach, Radish etc. with improved package of practices - Growing of mid season cole crops such as Cauliflower (varieties – Improved Japanese, Pusa Synthetic, Pusa Snowball etc.) and Cabbage (Varieties – Golden Acre, Pride of India, Pusa Mukta etc.), Knolkhol (White Vienna) etc.	
		Chilli/turmeric/ginger/pumpkin/radish/french bean/cucumber/ bitter gourd/ brinjal//Potato/turnip/beetroot/tomato/carrot/ cauliflower/onion/peas/lettuce/ cabbage/ brocolli	Life saving supplemental irrigation -Harvesting of kharif crops at physiological maturity stage. - Pre-sowing irrigation for nursery raising and life saving irrigation after transplanting	Growing of Tomato, Brinjal, and Leafy vegetables like Spinach, Radish etc. with improved package of practices - Growing of mid season cole crops such as Cauliflower (varieties – Improved Japanese, Pusa Synthetic, Pusa Snowball etc.) and Cabbage (Varieties – Golden Acre, Pride of India, Pusa Mukta etc.), Knolkhol (White Vienna) etc.	
	2) Farming	Potato/	-Life saving supplemental -	- Growing of mid season cole	

	situation: Rainfed medium land/ Medium low land (Sandy loam to clay loam)	turnip/beetroot/tomato/carrot/cauliflower/onion/peas/lettuce/ cabbage/ brocolli	irrigation - Pre-sowing irrigation for nursery raising and life saving irrigation after transplanting - Harvesting of kharif crops at physiological maturity stage	crops such as Cauliflower (varieties – Improved Japanese, Pusa Synthetic, Pusa Snowball etc.) and Cabbage (Varieties – Golden Acre, Pride of India, Pusa Mukta etc.), Knolkhol (White Vienna) etc. Mulching in Rabi crops	

2.1.2 Drought - Irrigated situation

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in canals due to low rainfall	Lower altitudes	Rice	No change	Medium or short duration variety can be grown if water is delayed by 15days Rice seeds should be replaced by Short duration variety such as luit vivek dhan 82 etc Rice should be replaced by other crops such as pulses If the water in canals is delayed by 90 days	
Limited releaseof water in canals due to low rainfall	Lower altitudes	Rice	Rice sowing nursery delayed SRI nursery to be used	Late duration varieties 8-10days old seedling is used for transplanting	
Non release of water in canals under delayed onset of monsoon in	Lower altitudes	Rice	SRI hybrids can be used Delayed transplanting	Low seed rate Direct sown under transplanting	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
catchment					
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Lower altitudes	Rice	Delayed transplanting	Direct sown under unpuddled condition	
Insufficient groundwater recharge due to low rainfall	Lower altitudes	Rice	Late duration	Direct sown under unpuddled condition	

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 stage**	**Post harvest**
Crop1 Rice	Not a substantial problem as uplands don't maintain water logging condition for long time	Provide drainage if possible	Drain out, Harvesting at physiological maturity stage	Shifting to a safer place in a well ventilated space
Crop2 Maize	Not a substantial problem as uplands don't maintain water logging condition for long time	Provide drainage if possible		
Horticulture				
Crop1 Vegetables	Proper drainage	Proper drainage	Drain out, Harvesting at physiological maturity stage	Store at optimum temperature and packed properly
	Adoption of proper measures to drain out excess water -Light hoeing and weeding - Adoption of plant protection measures against Anthracnose disease	- Adoption of proper measures to drain out excess water - Adoption of plant protection measures against Anthracnose disease	Adoption of proper measures to drain out excess water - Harvesting at physiological maturity - Adoption of plant protection measures against Anthracnose	Drying of the produce - Immediate sale of the produce - Shifting of the produce to

			disease	drier place/cold storage
Heavy rainfall with high speed winds in a short span[2]				
Crop1 Rice	Drainage if water logging persists Small seedling withstand the problem	Drainage if water logging persists Small seedling withstand the problem	Lodged panicles may be harvested at physiological maturity stage.	Dry and store in air tight condition
Crop2 Maize	Ridge planting, proper drainage	Proper drainage		
Horticulture				
Crop1 Vegetables	Ridge planting, proper drainage - Make trenches/furrows to facilitate drainage of excess water - Proper support for climbers	Proper drainage - Make trenches/furrows to facilitate drainage of excess water - Application of hormones, nutrients to prevent flower drop	Drain out and harvest the crop at optimum stage. - Make trenches/furrows to facilitate drainage of excess water	Store at optimum temperature and packed properly - Shifting of the produce to drier place/Cold storage
Crop2 Citrus Fruits	Proper drainage	Application of PGRs, (Auxin) and boron to enhance fruit set	Drain out and harvest the crop at maturity.	
Outbreak of pests and diseases due to unseasonal rains				
Crop1 Rice	Monitoring incidence of pest and disease through survey and surveillance programme Clipping the tip of rice seedlings before transplanting to kill egg massess of stem borer	During flowering stage crop is usually infected by blast and sheath blight. Crop can be protected by spraying with Pseudomonas fluorescens @ 2.5 kg/ha Release of egg parasitoid *Trichogramma japonicum* and *T. chilonis* for stem borer and leal floder respectively Spraying with neem based formulation pesticide to disrupt the growth and development of sucking pests	Draining out water for the management of bacterial leaf blight	Proper sun drying and safe storage for pratection against pests, diseases and rodents

Crop2 Maize	Early sowing to overcome cob borer attack Growing RCM1-1 and local yellow varieties to escape from cob borer damage	Spraying of Neem oil @3ml/l at the silking stage reduce cob borer and sucking pests	Harvesting at Physiological maturity to avoid further attack of pests and diseases	Safe storage against storage pest and diseases
Crop3 Potato	Avoiding planting in low lying water logged areas Growing varieties having moderate to high degree of resistance to late blight Give prophylactic spray with *Trichoderma* based formulation as son as the weather conditions become congenial for blights to occur	Roguing off off type , diseased plants showing necrosis, wilting, mottling, mosaic, crinkle and leaf rolling symptoms	Release of *Trichogramma brasilensis* during high adult activities of caterpillars Irrigate judiciously at the time of tuber initiation to maturity to manage common scab	Store healthy tubers in cold storage with moth proof structures with 2-3 cm thick layers of chopped dried leaves of Lantana camara
Crop4 Ginger	Soil drenching with *Trichoderma* viride @ 2.5-5 kg ammended with FYM against soil borne pathogens	Application of GF1 botanical formulation @ 5ml/l against soft rot Remove and destroy infested plant parts to reduce rhizome fly infestation	Harvesting of crop at proper timing to prevent further infection and infestation of diseases and pests	Storage in dry places to avoid rotting during storage
Horticulture				
Crop 1 Cabbage	Disease resistant varieties, Crop rotation Seed treatment with *Trichoderma viride* @4g/kg seed Soil solarization with black polythene sheet in nursery beds for 2-3 weeks	Growing of two rows of mustard after every 25 rows as a trap crop Spray NSKE 5% at primodial stage to check Diamond back moth If required spray Trichoderma viride @ 5g/l to check Alternaria blight	Harvest the crops at physiological maturity stage	
Crop 2 Tomato	Seed bed about 10 cm high for good drainage to avoid soil borne diseases Seed treatment with *Trichoderma viride* @ 4g/kg seed	Use nylon nets to avoid entry of white flies Spray 5% NSKE against leaf miner and other sucking pests Release of *Trichogramma chilonis* 50,000 eggs /ha six times from flower initiation	Harvest the crops at physiological maturity stage	

Citrus	Pruning and burning oof dried and weathered branches and pasting with bordeaux paste	Collection and destruction of adults by shaking the trees for the control of trunk borer Pasting the tree trunk with Bordeaux mixture is effective against Phythophthora rot Injecting 5 ml of kerosene per bore hole and sealing with mud is effective against trunk and shoot borer	Fallen fruit shoor be collected regularly and burried deep to control friut flies Harvest the fruits at physiological maturity stage	Safe storage to protect against storage rots

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Crop1 : Rice Crop2:Maize	Drain out excessive water Ridge planting, proper drainage	Drain out excessive water Proper drainage	Drain out, Harvesting at physiological maturity stage	Dry and store in air tight condition
Horticulture /Plantation crops				
Vegetables	Drainage of flood water -Hoeing in between lines for aeration in root zone after flood	-Drainage of flood water -Hoeing in between lines for aeration in root zone after flood	Drainage of flood water **-Hoeing in between lines for aeration in root zone after flood**	-Harvesting of produce as early as possible
Continuous submergence for more than 2 days[2]				
Crop1: Rice Crop 2: Maize	Drain out excessive water Re sowing may required if crop is damaged by flood	Drain out excessive water	Drain out, Harvesting at physiological maturity stage	Dry and store in air tight condition
Horticulture / Plantation crops				

Vegetables	Drainage of flood water - Re sowing may required if crop is damaged by flood. -Hoeing in between lines for aeration in root zone after flood	-Drainage of flood water -Hoeing in between lines for aeration in root zone after flood -	-Drainage of flood water -Hoeing in between lines for aeration in root zone after flood	-Harvesting of produce as early as possible
Sea water intrusion[3]	Not Applicable			

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

Extreme event type	**Suggested contingency measure**[r]			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave	Not applicable			
Cold wave				
Frost				
Rice Maize Rapeseed/Mustard Wheat	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised for rice. Provide irrigation, grow frost resistant variety	Provide irrigation		
Horticulture				
Cole crops	Provide shade	Irrigation before and just after the occurrence of frost		
Fruits trees	Mulching	Mulching	Mulching	Mulching
Hailstorm				
Rice	Replanting of seedlings	ITK & Top dressing	Availing Insurance.	Availing Insurance
Maize	Introduction of short duration late sowing varieties. Resowing may be advocated . Crop/weather insurance.	Cultural operations-Earthing up,Top dressing Crop can be used as fodder. Availing Insurance	Crop can be used as fodder. Availing Insurance.	Availing Insurance.
Rabi Pulses	Resowing can be done if seedling is damaged	Cultural operations-Earthing	Availing Insurance	Availing Insurance

		up		
Horticulture				
Potato	Resowing with short duration varieties	Cultural operations-Earthing up	Availing insurance	dehalming
Vegetables	Replanting of seedlings, Introduction of short duration late sowing variety Crop/weather insurance	Gap filling	Availing Insurance.	Availing Insurance.
Ginger	-	Adequate mulching. Availing Insurance.	-	-
Cyclone	Not applicable			
Sand deposition or heavy siltation				

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	i. Encourage perennial fodder on bunds and waste land on community basis; ii.Establishing fodder banks iii.Encouraging hedge row species for fodder crops iv Preparation of Hay & silage v. Training & awareness camp among extension personnel for needful at time of exigencies	i.Utilizing fodder from perennial trees and Fodder bank reserve. ii.Import of excess fodder from other districts. iii. utilization of non- conventional fodders. iv. Unproductive animals should be culled v. Use of feed mixtures and feed blocks Culling	i. animal insurance ii. Health care facilities iii. Programme for fodder rejuvenation
Drinking water	i. Roof top water harvesting ii. Water preservation in tanks for drinfking purpose. iii. Water harvesting in Jalkund Structure	i. utilization of stored water for drinking ii. Avoid wastage of water and recycling of used water for other purposes	Maintainance and construction of water source
Health and Disease management	i. vaccination and medical supply to be made available.	i. Supplementation of essential minerals.	animals infected with contagious diseases to be culled.

	Ii. Insurance of the livestock	ii.Conducting animal health camp	
Floods	**Not applicable**		
Feed and fodder availability			
Drinking water			
Health and Disease management			
Cyclone	**Not applicable**		
Feed and fodder availability			
Drinking water			
Health and Disease management			
Heat wave and cold wave			
Shelter/ environment management	i. the animal shed should be constructed with wooden floorings and the walls must be well protected. ii. artificial light must be provided in the creep area to prevent mortality of piglets. iii. the shed should be located where there is good wind control	i. worn out sheds must be renovated . ii. ensure that the shed have the facility for sufficient sunlight during the day (half walled) iii. use of bedding materials like dry paddy straw or saw dust to keep the animals warm	
Health and Disease management	i. veterinary assistance	i. vaccination and health camps ii. supplying of essential vitamins and minerals	

2.5.2 Poultry

	Suggested contingency measures		
	Before the event [s]	**During the event**	**After the event**
Drought			
Shortage of food ingredients	i. buying of feed ingredients and proper storage facility. ii. Local production of feed ingredients	i. use of reserved feeds from feed banks and storage facility. ii. use of non conventional feeds	Proper supplementation to the poultry
Drinking water	i. Roof top water harvesting ii. Water preservation in tanks for drinking purpose	Use of water from water harvested water and from tanks	.
Health and Disease management	i. vaccination and medical assistance to the birds ii.insurance	i.Vitamins and feed supplements ii. mass vaccination and health camps	animals infected with contagious diseases to be culled.

Floods	Not applicable		
Cyclone			
Heat wave and cold wave			
Shelter/ environment management	i. provision for artificial heat should be available ii.saw dust, paddy husk should be kept in stock	i. continual supply of light to maintain optimum temperature ii. chowlas can be used in absence of electricity. iii.	animals infected with contagious diseases to be culled.
Health and Disease management	Veterinary preparedness with medicines and vaccines	i. Urgent vaccination and quarantine of affected birds ii. Supplementation of vitamins	

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event [a]	**During the event**	**After the event**
1) Drought			
A. Capture			
Marine	NA	NA	NA
Inland	NA	NA	NA
(i) Shallow water depth due to insufficient rains/ inflow	NA	NA	NA
(ii) Changes in water quality	NA	NA	NA
(iii) Any other	NA	NA	NA
B. Aquaculture	NA	NA	NA
(i) Shallow water depth due to insufficient rains/ inflow	1. Water supply from other sources	1. Water supply from other sources/Reduce stock	1. Partial harvesting & lime/fertilizer application
(ii) Impact of salt load build up in ponds/ change in water quality	1. Aeration of water surface to increase the dissolved Oxygen 2. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)	1. Partial dewatering, refilling with fresh water 2. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)	1. Partial harvesting & lime/fertilizer application 2. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)
2) Floods			
A. Capture	NA	NA	NA
Marine	NA	NA	NA

Inland	NA	NA	NA
(i) Average compensation paid due to loss of human life	NA	NA	NA
(ii) No. of boats/ nets damaged	NA	NA	NA
(iii) No. of houses damaged	NA	NA	NA
(iv) Loss of stock	NA	NA	NA
(v) Changes in water quality	NA	NA	NA
(vi) Health and Diseases	NA	NA	NA
B. Aquaculture	NA	NA	NA
(i) Inundation with flood water	1. Provision of overflow drainage system 2. Drainage system on the sides of the pond to prevent the surface runoff water from entering the pond	1. Siphon excess water from the pond 2. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) 3. Lime, fertilizer application based on the water quality	1. Maintaining desired water level 2. Analysis of water quality (pH, alkalinity, salinity, temperature etc. 3. Liming, fertilizer application based on the water quality
(ii) Water continuation and changes in water quality	1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) **2.** lime, fertilizer application based on the water quality	1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) **2.** lime, fertilizer application based on the water quality	1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) **2.** lime, fertilizer application based on the water quality
(iii) Health and diseases	Maintaining proper hygiene/water quality	1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) 2. Lime, fertilizer application based on the water quality **3.** Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.	1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) 2. Lime, fertilizer application based on the water quality **3.** Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.
3) Cyclone/ Tsunami			
A. Capture	NA	NA	NA
Marine	NA	NA	NA
(i) Average compensation paid due to loss of fishermen lives	NA	NA	NA
(ii) Average no. of boats/ nets damaged	NA	NA	NA
(iii) Average mo. of houses damaged	NA	NA	NA
Inland	NA	NA	NA
B. Aquaculture			
(i) Overflow/ flooding of ponds	Provision of overflow drainage system Drainage system on the sides of the	Siphon excess water from the pond Analysis of water quality (pH, alkalinity, salinity, temperature etc.)	Maintaining desired water level Analysis of water quality (pH, alkalinity, salinity, temperature etc.

	pond to prevent the surface runoff water from entering the pond	Lime, fertilizer application based on the water quality	Liming, fertilizer application based on the water quality
(ii) Changes in water quality (fresh water/ brackish water ratio)	Analysis of water quality (pH, alkalinity, salinity, temperature etc.) lime, fertilizer application based on the water quality	Analysis of water quality (pH, alkalinity, salinity, temperature etc.) lime, fertilizer application based on the water quality	Analysis of water quality (pH, alkalinity, salinity, temperature etc.) lime, fertilizer application based on the water quality
(iii) Health and diseases	Maintaining proper hygiene/water quality	Analysis of water quality (pH, alkalinity, salinity, temperature etc.) Lime, fertilizer application based on the water quality Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.	Analysis of water quality (pH, alkalinity, salinity, temperature etc.) Lime, fertilizer application based on the water quality Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.
4. Heat wave and cold wave			
A. Capture			
Marine	NA	NA	NA
Inland	NA	NA	NA
B. Aquaculture			
(i) Changes in pond in pond environment (water quality)	1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) **2.** lime, fertilizer application based on the water quality	1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) **2.** lime, fertilizer application based on the water quality	1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) **2.** lime, fertilizer application based on the water quality
(ii) Health and Disease management	Maintaining proper hygiene/water quality	1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) 2. Lime, fertilizer application based on the water quality **3.** Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.	1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.) 2. Lime, fertilizer application based on the water quality **3.** Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.
(iii) Any other			