State: **SIKKIM**

Agriculture Contingency Plan for District: SOUTH SIKKIM

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Eastern Himalayas, Warm Perhumid Eco-Region (16.2)		
	Agro-Climatic Zone (Planning Commission)	Eastern Himalayan Region(II)		
	Agro Climatic Zone (NARP)	Tropical to temperate with lower to higher hills, alpine zone and snow bound areas.		
	List all the districts or part thereof falling under the NARP Zone	East Sikkim (Gangtok), South Sikkim (Namchi), North Sikkim (mangan), West Sikkim (Gyalsing)		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		27°12'40'' to 27°30'99''N	88°28'08'' to 88°29'07''E	300- 5000m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ICAR Research Complex for NEH Region, Sikkim Center, Tadong, Gangtok, Sikkim		
	Mention the KVK located in the district	KVK, South Sikkim, Namthang		

1.2	**Rainfall**	**Normal RF(mm)**	**Number of Rainy days**	**Normal Onset**	**Normal Cessation**
	SW monsoon (June-Sep)	658.40	66	2nd week of June	4th week of September
	NE Monsoon(Oct-Dec)	56.32	14	3rd week of October	2nd Week of November
	Winter (Jan- March)	22.72	14	1st week of January	3rd week of March
	Summer (Apr-May)	151.80	19	3rd week of April	3rd week of May
	Annual	889.24	113		

1.3	**Land use pattern of the district**	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
	Area ('000 ha)		38.581	2.519	2.754	1.209	2.754	4.515	2.086	1.004

1. 4	**Major Soils**	**Area ('000 ha)**	**Percent (%) of total**
	Brown- red		
	Yellow soil		
	Lateritic soil		
	Sandy loam		

1.5	**Agricultural land use**	**Area ('000 ha)**	**Cropping intensity %**
	Net sown area	21.74	126
	Area sown more than once	16.84	
	Gross cropped area	38.581	

1.6	**Irrigation**	**Area ('000 ha)**		
	Net irrigated area	2.105		
	Gross irrigated area	5.245		
	Rainfed area	15.435		
	Sources of Irrigation	Number	**Area ('000 ha)**	**% of total irrigated area**
	Canals			
	Tanks / ponds	13		
	Open wells			
	Bore wells			
	Lift irrigation schemes			
	Micro-irrigation	28	0.025	
	Other sources (Springs)			
	Catch water drains	2		
	Tap			
	Harvested water (rain)			
	Total Irrigated Area		2.105	
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	**No. of blocks/ Tehsils**	**(%) area**	**Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)**
	Over exploited			
	Critical			
	Semi- critical			
	Safe			
	Wastewater availability and use			
	Ground water quality			

***over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70**

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

1.7	Major field crops cultivated	Area ('000 ha)							
		Kharif			*Rabi*			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
	Maize	-	15.00	15.00	-	-	-	-	15.00
	Soybean	-	3.69	3.69	-	-	-	-	3.69
	Rice	-	2.46	2.46	-	-	-	-	2.46
	Buckwheat	-	1.38	1.38	-	-	-	-	1.38
	Blackgram	-	1.30	1.30	-	-	-	-	1.30
	Rapeseed and Mustard	-	-	-	1.30	1.30	-	-	1.30
	Wheat	-	-	-	-	1.25	1.25	-	1.25
	Finger Millet	-	0.95	0.95	-	-	-	-	0.95
	Other Pulses	-	0.82	0.82	-	-	-	-	0.82
	Barley	-	-	-	-	0.15	0.15	-	0.15

* Source: Food Security and Agriculture Development Department, Government of Sikkim, Annual Report 2008-09

	Horticultural crops	Total	Irrigated	Rainfed ('000 ha)
	Orange (Sikkim Mandarin)	0.926	-	0.926
	Passion fruit	0.270	-	0.270
	Other fruits	0.596	-	0.596
	Rabi Vegetables	1.392	-	-
	Kharif Vegetables	1.036	-	-

	Off-season Vegetables	1.529	-	-
	Potato (Kharif)	0.868	-	-
	Potato (Rabi)	1.050	-	-
	Other roots and tubers	0.203	-	-

*** Source: Horticulture and Cash Crop Development Department, Government of Sikkim, Annual Report (2007-08)**

1.7	**Medicinal and Aromatic crops**	**-**	**-**	**-**
1.7	**Plantation/ Spices crops**	**-**	**-**	**-**
	Large Cardamom	2.550	-	-
	Ginger	2.390	-	-
	Turmeric	0.276	-	-
	Tea	0.173	-	-

*** Source: Horticulture and Cash Crop Development Department, Government of Sikkim, Annual Report (2007-08)**

1.7f	**Fodder crops**	**Total area ('000 ha)**	**Irrigated area ('000 ha)**	**Rainfed area ('000 ha)**
1.7g	**Grazing land**			
1.7h	**Sericulture etc**	0.004	**-**	

1.8	**Livestock (in number)**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Indigenous Siri cattle	7.880	11.429	19.309
	Crossbred cattle	7.668	15.846	23.514
	Non descriptive Buffaloes (local low yielding)			0.087
	Graded Buffaloes			
	Goat	13.250	31.824	45.074
	Sheep	0.120	0.142	0.262
	Others (Pig)	7.704	9.851	17.555
	Commercial dairy farms (Number)			-
Source : Summary Report on 18th Livestock census 2007, Department of AH,LF& VS, Govt of Sikkim				

1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**
	Commercial (Broiler)		55.516
	Backyard (Layer)		57.770

1.10	**Fisheries (Data source: Chief Planning Officer of district)**						
	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)						

1.11 Production and Productivity of major crops

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder (‘000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops identified based on total acreage)										
	Maize	22.31	1590.26					22.31	1590.26	
	Rice	4.05	1689.69					4.05	1689.69	
	Blackgram	1.17	830.16					1.17	830.16	
	Finger Millet	0.94	955.49					0.94	955.49	
	Buckwheat	0.90	863.58					0.90	863.58	
	Soybean	1.142	875.93					1.142	875.93	
	Pulses	2.202	900.28					2.202	900.28	
	Wheat			1.95	1214.98			1.95	1214.98	
	Rape & Mustard	-	-	1.19	799.61			1.19	799.61	
	Barley	-	-	0.20	1013.33			0.20	1013.33	

Major Horticultural crops - Fruits (Crops identified based on total acreage)										
	Orange(Mandarin)	1.756	1896					1.756	1896	
	Passion fruit	0.057	211					0.057	211	
	Other fruits	1.058	1775					1.058	1775	

Horticultural Crops : Vegetables										
	Rabi Vegetables			6.179	4439			6.179	4439	
	Kharif Vegetables	5.047	4872					5.047	4872	
	Potato (Kharif)	3.710	4274					3.710	4274	
	Potato (Rabi)			5.218	4970			5.218	4970	
	Other roots and tubers	8.928	4655					8.928	4655	
Plantation/ Spice Crops										
	Large Cardamom	0.581	228					0.581	228	
	Ginger	13.288	5560					13.288	5560	
	Turmeric	0.953	3453					0.953	3453	

Source: Horticulture and Cash Crop Development Department, Government of Sikkim, Annual Report (2007-08)

1.12	**Sowing window for 5 major crops**	**Maize**	**Rice**	**Blackgram**	**Wheat**	**Rape and Mustard**
	Kharif-Rainfed	3rd week of February to 1st week of April		July to August	-	-
	Kharif-Irrigated		2nd week of June to 3rd week of July	-	-	-
	Rabi-Rainfed			-	2nd week of September to 2nd week of October	September to October (dry field)
	Rabi-Irrigated			-	November to December	2nd week of November to 2nd week of December (Paddy field)

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		√	
	Landslide	√		

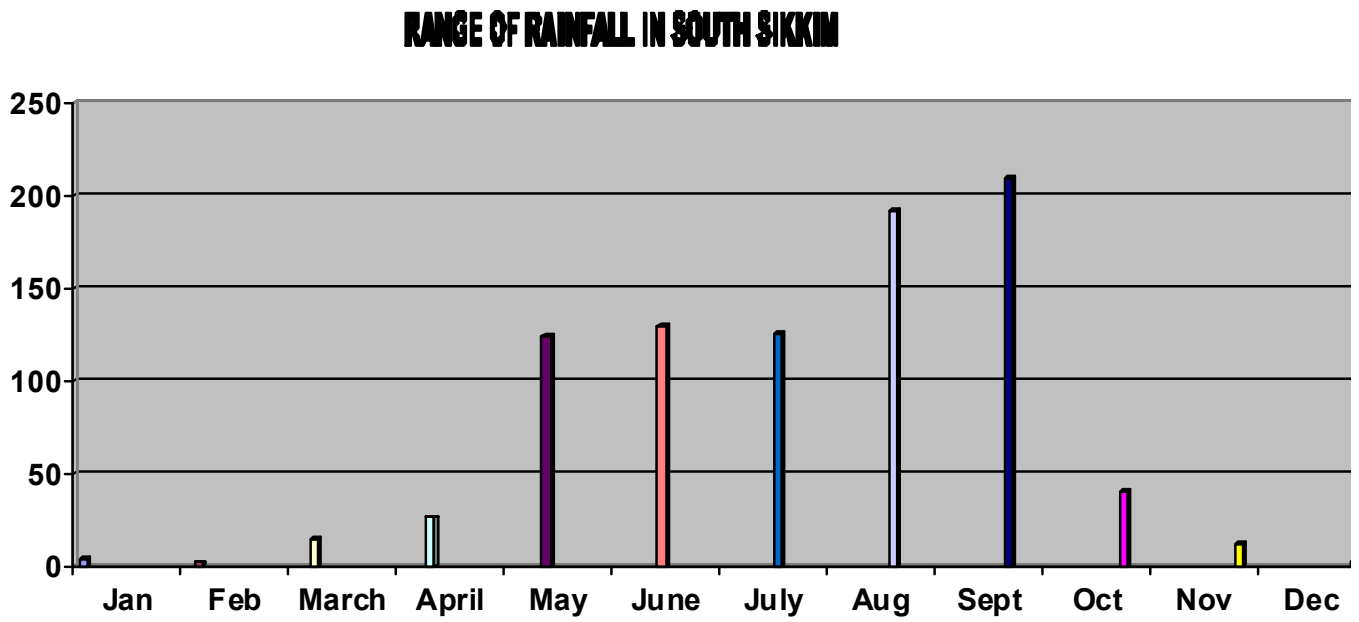
1.14	**Include Digital maps of the district for**	Location map of district within State as Annexure- I	Enclosed: Yes
		Mean annual rainfall as Annexure- II	Enclosed: Yes
		Soil map as Annexure -III	Enclosed: Yes

Annexure -1

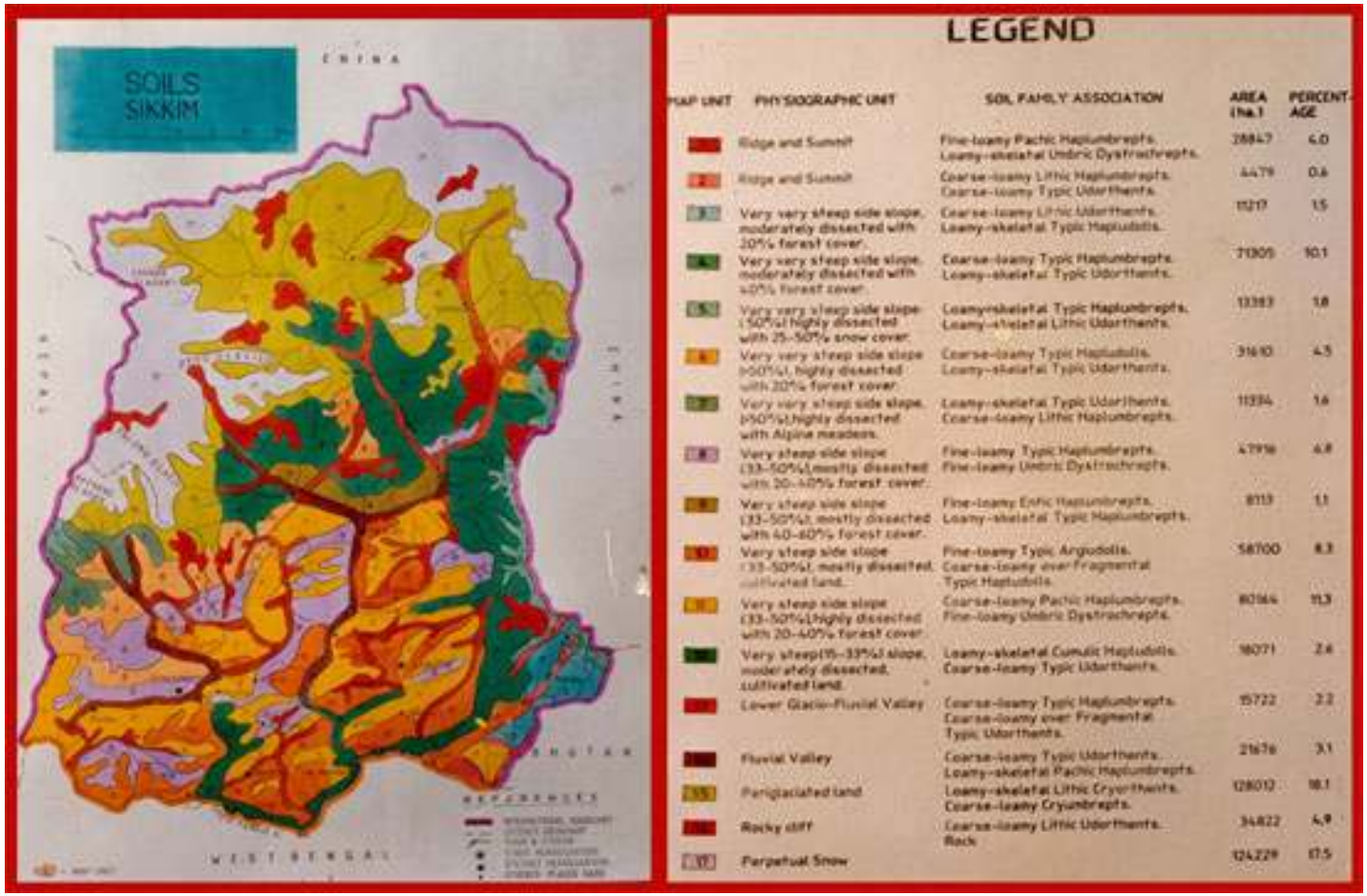
Location map of South Sikkim

Annexure-II

Mean Annual rainfall of South Sikkim



Annexure-III



Source: Department of Agriculture Govt. of Sikkim

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 **June 3rd week**	**Rainfed**	**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/ wheat/Barley f. Rabi Maize + Vegetables/ Mustard/Tori g. Maize + Potato/ Vegetables h. Maize + Topoica Perennial crops –Sikkim Mandarin, Large cardamom, other fruits	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	Supply of quality seeds through ICAR, ATMA, NSC, SAUs

		Paddy based cropping System a. Paddy b. Paddy + Black Gram (black gram in bund) c. Paddy + soybean (in bunds)			

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 weeks **July 1st week**	**Rainfed**	**Maize based Cropping System** a. Maize + Finger Millet (intercropping, Higher Altitude) b. Urd (after maize, lower elevation) c. Maize + Soyabean (intercropping, higher elevation) d. Maize + Ginger (Mid altitude region) e. Maize + Vegetables/ wheat/Barley f. Rabi Maize + Vegetables/ Mustard/Tori g. Maize + Potato/ Vegetables h. Maize + Topoica Perennial crops –Sikkim	**Field crops :** **Finger millet :** Indaf- 5, 8, 9, local (murkay, Mithay), VL Mandua-315, VL Mandua-324 **Maize :** C-1415, C-1837, HQPM-1, Vivek- 15, Vivek -9, Vivek-23 (Hybrid), Suwan Composite, Local **Urd:** Paheli dal (local) **Soybean:** PK-1042, 1024, PK-262, local (black bold) , VL-soya-47 **Ginger :** Nadia, Bhaisey **Barley :** VL-46, VL Barley-1, HBL-276, HBL-1 **Topoica :** Local **Horticultural crops** **Potato:** Kufri Jyoti, K. Chandramukhi, Kufri Badshah, K. Kanchan, 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 Transplanting of rice	Supply of quality seeds through ICAR, ATMA, NSC, SAUs

		Mandarin, Large cardamom, other fruits **Paddy based cropping System** a. Paddy b. Paddy + Black Gram (black gram in bund)	K. Giriraj **Cabbage**: Pusa Mukta, Green Ball, Bahar, Green Express, BC-76 **Cauliflower**: Pusa Kartik Shanker, Suwashini, Girija, Barkha, Excel-16, Pusa Sukti, Dania Kalimpong. **Knol-Khol** : Pusa Virat, Winner, **Tomato:** Avinash, Anup, Romeo, All Rounder, Rockey, Rupali, Kashi Vishesh **Broccoli:** Everest, Aishwarya, Palam Samridhi, Pusa KTS-1, Puspa. **Pea :** Arkel, Arka Ajit**,** Vivek Matar 9, Vivek Matar 8, Bonvelle, Azad. **Cowpea:** Kashi Kanchan, Pusa Komal. **Carrot:** Pusa Asita, Pusa Pudhira. **Okra:** VL Bhindi 1, Kashi Mangali, Kashi Vibhuti, Kashi Pragati, Kashi Satdhari. **Brinjal**: Pusa Sheetal, Pusa Shyamal, Pusa Bhairav, Kashi Taru, PPL, PPR. **French bean**: Arka Komal, Arka Sunidhi, VL Lata Bean 17, VL Lata Bean 12. **Bottle Gourd:** Pusa Naveen, Pusa Summer Prolific Long. **Turmeric :** Lakadong, Megha Turmeric-1 **Citrus** : Sikkim Mandarin **Large Cardamom** : Ramsay, Sawaney, Golsey, Varlangey **Paddy-** Sughandha-2, PD-10, KRH-2; Local (Attay, basmati Krishna bhog, japani **Black gram:** local	should be completed by mid week of July Solanaceous crops should be planted in well drained, slightly sloppy land System of rice intensification at lower elevation	

		c. Paddy + soybean (in bunds)			

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 6 weeks **July 3rd week**	**Rainfed**	**Maize based Cropping System** a. Maize + Finger Millet (intercropping, Higher Altitude) b. Urd (after maize, lower elevation) c. Maize + Soyabean (intercropping, higher elevation) d. Maize + Ginger (Mid altitude region) e. Maize + Vegetables/ wheat/Barley f. Rabi Maize + Vegetables/ Mustard/Tori g. Maize + Potato/ Vegetables h. Maize + Topoica Perennial crops –Sikkim Mandarin, Large cardamom, other fruits	**Field crops :** **Finger millet :** Indaf- 5, 8, 9, local (murkay, Mithay), VL Mandua-315, VL Mandua-324 **Maize :** C-1415, C-1837, HQPM-1, Vivek-15, Vivek -9, Vivek-23 (Hybrid), Suwan Composite, Local **Urd:** Paheli dal (local) **Soybean:** PK-1042, 1024, PK-262, local (black bold) , VL-soya-47 **Ginger :** Nadia, Bhaisey **Wheat:** HD 2402, HD 2643, HD-2687, PBW- 343, VL 798, VW 0254, VW 0270, VW 0321, VL Gehun 832, VL Gehun 802 **Barley :** VL-46, VL Barley-1, HBL-276, HBL-1 **Topoica :** Local **Mustard / Rapeseed:** TS-29, TS-36, TS-38 TM-2, M 27, SS-I-II, Pusa Jaikisan, Pusa bold	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	Supply of quality seeds through ICAR, ATMA, NSC, SAUs

			Vegetable crops **Potato:** Kufri Jyoti, K. Chandramukhi, Kufri Badshah, K. Kanchan, K. Megha, K. Giriraj **Cabbage**: Pusa Mukta, Green Ball, Bahar, Green Express, BC-76 **Cauliflower**: Pusa Kartik Shanker, Suwashini, Girija, Barkha, Excel-16, Pusa Sukti, Dania Kalimpong. **Knol-Khol** : Pusa Virat, Winner, **Tomato:** Avinash, Anup, Romeo, All Rounder, Rockey, Rupali, Kashi Vishesh **Broccoli:** Everest, Aishwarya, Palam Samridhi, Pusa KTS-1, Puspa. **Pea :** Arkel, Arka Ajit**,** Vivek Matar 9, Vivek Matar 8, Bonvelle, Azad. **Cowpea:** Kashi Kanchan, Pusa Komal. **Carrot:** Pusa Asita, Pusa Pudhira. **Okra:** VL Bhindi 1, Kashi Mangali, Kashi Vibhuti, Kashi Pragati, Kashi Satdhari. **Brinjal**: Pusa Sheetal, Pusa Shyamal, Pusa Bhairav, Kashi Taru, PPL, PPR. **French bean**: Arka Komal, Arka Sunidhi, VL Lata Bean 17, VL Lata Bean 12. **Bottle Gourd:** Pusa Naveen, Pusa Summer Prolific Long. **Turmeric :** Lakadong, Megha Turmeric-1 **Citrus** : Sikkim Mandarin **Large Cardamom** : Ramsay, Sawaney, Golsey, Varlangey **Paddy-** Sughandha-2, PD-10, KRH-2; Local (Attay, basmati Krishna bhog, japani **Black gram:** local	with green leaves Solanaceous crops should be planted in well drained, slightly sloppy land SRI technique of paddy cultivation (20 X 20) cm	
		Paddy based cropping System a. Paddy b. Paddy + Black Gram (black gram in bund) c. Paddy + soybean (in bunds)			

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** **August 1st week**	**Rainfed**	**Maize based Cropping System** a. Maize + Finger Millet (intercropping, Higher Altitude) b. Urd (after maize, lower elevation) c. Maize + Soyabean (intercropping, higher elevation) d. Maize + Ginger (Mid altitude region) e. Maize + Vegetables/ wheat/Barley f. Rabi Maize + Vegetables/ Mustard/Tori g. Maize + Potato/ Vegetables h. Maize + Topoica Perennial crops –Sikkim Mandarin, Large cardamom, other fruits	**Field crops :** **Finger millet :** Indaf- 5, 8, 9, local (murkay, Mithay), VL Mandua-315, VL Mandua-324 **Maize :** C-1415, C-1837, HQPM-1, Vivek-15, Vivek -9, Vivek-23 (Hybrid), Suwan Composite, Local **Urd:** Paheli dal (local) **Soybean:** PK-1042, 1024, PK-262, local (black bold) , VL-soya-47 **Ginger :** Nadia, Bhaisey **Barley :** VL-46, VL Barley-1, HBL-276, HBL-1 **Topoica :** Local **Horticultural crops** **Potato:** Kufri Jyoti, K. Chandramukhi, Kufri Badshah, K. Kanchan, K. Megha, K. Giriraj **Cabbage**: Pusa Mukta, Green Ball, Bahar, Green Express, BC-76 **Cauliflower**: Pusa Kartik Shanker, Suwashini, Girija, Barkha, Excel-16, Pusa	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 Intercropping of pulses with maize Timely thinning to maintain proper spacing Mulching of crops	Supply of quality seeds through ICAR, ATMA, NSC, SAUs

			Sukti, Dania Kalimpong. **Knol-Khol** : Pusa Virat, Winner, **Tomato:** Avinash, Anup, Romeo, All Rounder, Rockey, Rupali, Kashi Vishesh **Broccoli:** Everest, Aishwarya, Palam Samridhi, Pusa KTS-1, Puspa. **Pea :** Arkel, Arka Ajit**,** Vivek Matar 9, Vivek Matar 8, Bonvelle, Azad. **Cowpea:** Kashi Kanchan, Pusa Komal. **Carrot:** Pusa Asita, Pusa Pudhira. **Okra:** VL Bhindi 1, Kashi Mangali, Kashi Vibhuti, Kashi Pragati, Kashi Satdhari. **Brinjal**: Pusa Sheetal, Pusa Shyamal, Pusa Bhairav, Kashi Taru, PPL, PPR. **French bean**: Arka Komal, Arka Sunidhi, VL Lata Bean 17, VL Lata Bean 12. **Bottle Gourd:** Pusa Naveen, Pusa Summer Prolific Long. **Turmeric :** Lakadong, Megha Turmeric-1 **Citrus** : Sikkim Mandarin **Large Cardamom** : Ramsay, Sawaney, Golsey, Varlangey **Paddy-** Sughandha-2, PD-10, KRH-2; Local (Attay, basmati Krishna bhog, japani **Black gram:** local	with green leaves Early sowing of winter vegetables/ field crops SRI technique of paddy cultivation (20 X 20) cm	
		Paddy based cropping System a. Paddy b. Paddy + Black Gram (black gram in bund) c. Paddy + soybean (in bunds)			

Condition			**Suggested Contingency measures**		
Early season	**Major**	**Normal Crop / Cropping**	**Crop management**	**Soil nutrient &**	**Remarks on**

drought (Normal onset)	Farming situation	system		moisture conservation measures	Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/ crop stand etc.	**Rainfed**	**Maize based Cropping System** a. Maize + Finger Millet (intercropping, Higher Altitude) b. Urd (after maize, lower elevation) c. Maize + Soyabean (intercropping, higher elevation) d. Maize + Ginger (Mid altitude region) e. Maize + Vegetables/ wheat/Barley f. Rabi Maize + Vegetables/ Mustard/Tori g. Maize + Potato/ Vegetables h. Maize + Topoica Perennial crops –Sikkim Mandarin, Large cardamom, other fruits	**Field crops :** **Finger millet :** Indaf- 5, 8, 9, local (murkay, Mithay), VL Mandua-315, VL Mandua-324 **Maize :** C-1415, C-1837, HQPM-1, Vivek- 15, Vivek -9, Vivek-23 (Hybrid), Suwan Composite, Local **Urd:** Paheli dal (local) **Soybean:** PK-1042, 1024, PK-262, local (black bold) , VL-soya-47 **Ginger :** Nadia, Bhaisey **Wheat:** HD 2402, HD 2643, HD-2687, PBW- 343, VL 798, VW 0254, VW 0270, VW 0321, VL Gehun 832, VL Gehun 802 **Barley :** VL-46, VL Barley-1, HBL-276, HBL-1 **Topoica :** Local **Mustard / Rapeseed:** TS-29, TS-36, TS-38 TM-2, M 27, SS-I-II, Pusa Jaikisan, Pusa bold **Horticultural crops** **Potato:** Kufri Jyoti, K. Chandramukhi, Kufri Badshah, K. Kanchan, K. Megha, K. Giriraj **Cabbage**: Pusa Mukta, Green Ball, Bahar, Green Express, BC-76 **Cauliflower**: Pusa Kartik Shanker, Suwashini, Girija, Barkha, Excel-16, Pusa Sukti, Dania Kalimpong. **Knol-Khol** : Pusa Virat, Winner, **Tomato:** Avinash, Anup, Romeo, All Rounder, Rockey, Rupali, Kashi Vishesh **Broccoli:** Everest, Aishwarya, Palam Samridhi, Pusa KTS-1, Puspa. **Pea :** Arkel, Arka Ajit**,** Vivek Matar 9, Vivek Matar 8, Bonvelle, Azad. **Cowpea:** Kashi Kanchan, Pusa Komal.	Mulching with green/ dry leaves Wider spacing (60 X 30) cm for maize Frequent interculture operation for conservation of moisture Cover cropping with main crop Furrow application of FYM Soil moisture conservation measures to be followed	Supply of quality seeds through ICAR, ATMA, NSC, SAUs

			Carrot: Pusa Asita, Pusa Pudhira. **Okra:** VL Bhindi 1, Kashi Mangali, Kashi Vibhuti, Kashi Pragati, Kashi Satdhari. **Brinjal**: Pusa Sheetal, Pusa Shyamal, Pusa Bhairav, Kashi Taru, PPL, PPR. **French bean**: Arka Komal, Arka Sunidhi, VL Lata Bean 17, VL Lata Bean 12. **Bottle Gourd:** Pusa Naveen, Pusa Summer Prolific Long. **Turmeric :** Lakadong, Megha Turmeric-1 **Citrus** : Sikkim Mandarin **Large Cardamom** : Ramsay, Sawaney, Golsey, Varlangey	Early sowing of winter vegetables/ field crops Water harvesting in Jalkund for life saving irrigation	
		Paddy based cropping System a. Paddy b. Paddy + Black Gram (black gram in bund) c. Paddy + soybean (in bunds)	**Paddy-** Sughandha-2, PD-10, KRH-2; Local (Attay, basmati Krishna bhog, japani **Black gram:** local		

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell consecutive 2 weeks rainless, (> 2.5mm) period	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**

At vegetative stage	**Rainfed**	**Maize based Cropping System** a. Maize + Finger Millet (intercropping, Higher Altitude) b. Urd (after maize, lower elevation) c. Maize + Soyabean (intercropping, higher elevation) d. Maize + Ginger (Mid altitude region) e. Maize + Vegetables/ wheat/Barley f. Rabi Maize + Vegetables/ Mustard/Tori g. Maize + Potato/ Vegetables h. Maize + Topoica Perennial crops –Sikkim Mandarin, Large cardamom, other fruits	**Field crops :** **Finger millet :** Indaf- 5, 8, 9, local (murkay, Mithay), VL Mandua-315, VL Mandua-324 **Maize :** C-1415, C-1837, HQPM-1, Vivek-15, Vivek -9, Vivek-23 (Hybrid), Suwan Composite, Local **Urd:** Paheli dal (local) **Soybean:** PK-1042, 1024, PK-262, local (black bold) , VL-soya-47 **Ginger :** Nadia, Bhaisey **Wheat:** HD 2402, HD 2643, HD-2687, PBW- 343, VL 798, VW 0254, VW 0270, VW 0321, VL Gehun 832, VL Gehun 802 **Barley :** VL-46, VL Barley-1, HBL-276, HBL-1 **Topoica :** Local **Mustard / Rapeseed:** TS-29, TS-36, TS-38 TM-2, M 27, SS-I-II, Pusa Jaikisan, Pusa bold **Horticultural crops** **Potato:** Kufri Jyoti, K. Chandramukhi, Kufri Badshah, K. Kanchan, K. Megha, K. Giriraj **Cabbage**: Pusa Mukta, Green Ball, Bahar, Green Express, BC-76 **Cauliflower**: Pusa Kartik Shanker, Suwashini, Girija, Barkha, Excel-16, Pusa Sukti, Dania Kalimpong. **Knol-Khol** : Pusa Virat, Winner, **Tomato:** Avinash, Anup, Romeo, All Rounder, Rockey, Rupali, Kashi Vishesh **Broccoli:** Everest, Aishwarya, Palam Samridhi, Pusa KTS-1, Puspa. **Pea :** Arkel, Arka Ajit**,** Vivek Matar 9,	Mulching with green/ dry leaves Wider spacing (60 X 30) cm for maize Frequent interculture operation for conservation of moisture Life saving irrigation Cover cropping with main crop Furrow application of FYM Soil moisture conservation measures to be followed Early sowing of winter vegetables/ field crops Water harvesting in Jalkund for life saving irrigation	Supply of quality seeds through ICAR, ATMA, NSC, SAUs

		Paddy based cropping System a. Paddy b. Paddy + Black Gram (black gram in bund) c. Paddy + soybean (in bunds)	Vivek Matar 8, Bonvelle, Azad. **Cowpea:** Kashi Kanchan, Pusa Komal. **Carrot:** Pusa Asita, Pusa Pudhira. **Okra:** VL Bhindi 1, Kashi Mangali, Kashi Vibhuti, Kashi Pragati, Kashi Satdhari. **Brinjal**: Pusa Sheetal, Pusa Shyamal, Pusa Bhairav, Kashi Taru, PPL, PPR. **French bean**: Arka Komal, Arka Sunidhi, VL Lata Bean 17, VL Lata Bean 12. **Bottle Gourd:** Pusa Naveen, Pusa Summer Prolific Long. **Turmeric :** Lakadong, Megha Turmeric-1 **Citrus** : Sikkim Mandarin **Large Cardamom** : Ramsay, Sawaney, Golsey, Varlangey **Paddy-** Sughandha-2, PD-10, KRH-2; Local (Attay, basmati Krishna bhog, japani **Black gram:** local		

Condition			**Suggested Contingency measures**		
Mid season drought (long dry	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**

spell)					
At flowering/ fruiting stage	**Rainfed**	**Maize based Cropping System** a. Maize + Finger Millet (intercropping, Higher Altitude) b. Urd (after maize, lower elevation) c. Maize + Soyabean (intercropping, higher elevation) d. Maize + Ginger (Mid altitude region) e. Maize + Vegetables/ wheat/Barley f. Rabi Maize + Vegetables/ Mustard/Tori g. Maize + Potato/ Vegetables h. Maize + Topoica Perennial crops –Sikkim Mandarin, Large cardamom, other fruits **Paddy based cropping System** a. Paddy b. Paddy + Black Gram (black gram in bund) c. Paddy + soybean (in bunds)	Wider spacing (60 X 30) cm for maize Furrow application of FYM Cover cropping with main crop	Mulching with green/ dry leaves Frequent interculture operation for conservation of moisture Life saving irrigation Soil moisture conservation measures to be followed Water harvesting in Jalkund for life saving irrigation	Supply of quality seeds through ICAR, ATMA, NSC, SAUs

Condition			**Suggested Contingency measures**		
Terminal drought (early	**Major farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop Planning**	**Remarks on Implementation**

withdrawal of Monsoon)					
At vegetative stage	**Rainfed**	**Maize based Cropping System** a. Maize + Finger Millet (intercropping, Higher Altitude) b. Urd (after maize, lower elevation) c. Maize + Soyabean (intercropping, higher elevation) d. Maize + Ginger (Mid altitude region) e. Maize + Vegetables/ wheat/Barley f. Rabi Maize + Vegetables/ Mustard/Tori g. Maize + Potato/ Vegetables h. Maize + Topoica Perennial crops –Sikkim Mandarin, Large cardamom, other fruits **Paddy based cropping System** a. Paddy b. Paddy + Black Gram (black gram in bund) c. Paddy + soybean (in bunds)	Mulching with green/ dry leaves Wider spacing (60 X 30) cm for maize Life saving irrigation Cover cropping with main crop Furrow application of FYM Soil moisture conservation measures to be followed Frequent interculture operation for conservation of moisture Water harvesting in Jalkund for life saving irrigation	Sowing of mustard during September in dry field	Supply of quality seeds through ICAR, ATMA, NSC, SAUs

2.1.2 Drought - Irrigated situation – Not applicable

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	Paddy field	Paddy (sub merged condition)		SRI	
Limited release of water in canals due to low rainfall	Not applicabl				
Non release of water in canals under delayed onset of monsoon in catchment					
Lack of inflows into tanks due to insufficient /delayed onset of monsoon					
Insufficient groundwater recharge due to low rainfall					

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**
Maize	Ridge planting, proper drainage	Provide drainage	Drain out water, Harvesting at physiological maturity stage	Shift to safer and dry place
Soyabean	Ridge planting, proper drainage	Provide drainage	Drain out water	Shift to safe place, dry in shade and turn frequently
Blackgram	Provide drainage	Provide drainage	Drain out water	Safe storage in dry place, protect against storage pest and disease
Paddy	Drain out excess water	Drain out excess water	Drain out excess water	Dry and safe storage, protect against storage pest and disease
Rape seed & mustard	Ridge planting, proper drainage	Provide drainage		Dry and store in air tight condition
Finger millet	Drain out excess water	Drain out excess water	Drain out excess water	Shift to safer and dry place
Horticulture				
Orange & other fruits	Provide drainage, protection from fungal diseases	Provide drainage, protection from fungal diseases	Drainage, protection from fungal diseases	Store in shady and dry place, quick marketing
Ginger	Ridge planting, drainage, protection from fungal diseases	Proper drainage	Drainage,	Dry and safe storage at optimum temperature
Cardamom	protection from fungal diseases	protection from fungal diseases	protection from fungal diseases	Quick drying and safe storage
Vegetables	Ridge planting, provide drainage and protection from fungal disease	Provide drainage	Drainage	Dry and shift to safer place having optimum temperature

Heavy rainfall with high speed winds in a short span[2]				
Outbreak of pests and diseases due to unseasonal rains				
Maize Finger millet Rape & mustard Urd Soyabean	Need based plant protection IPDM, disease resistant varieties, IPM for pluses	Need based plant protection,IPDM, IPM for pluses		Safe storage, protection against storage pest and diseases
Paddy				
Horticulture				
Mandarin Other fruits	Need based plant protection IPDM	Need based plant protection IPDM		Safe storage, protection against storage pest and diseases
Ginger Cardamon Vegetables Other spices	Need based plant protection IPDM Resistant varieties Crop rotation	Need based plant protection IPDM Bio control	Harvest the crop	Safe storage, protection against storage pest and diseases

2.3 Floods: Not experienced

Condition	**Suggested contingency measure[o]**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Continuous submergence for more than 2 days				
Sea water intrusion				

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone : Not experienced / encountered

Extreme event type	Suggested contingency measure[r]			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave				
Cold wave				
Mustard Pea wheat Finger millet Soybean	Irrigation Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised	Irrigation Replanting Planting of trees to act as wind break Staking of plants	Irrigation Planting of trees (wind break)	Go for early harvest
Horticulture				
Cardamom Orange Potato Vegetables	Irrigation Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised	Irrigation Replanting Planting of trees to act as wind break Staking of plants	Irrigation Planting of trees (wind break)	Go for early harvest
Frost				
Mustard Finger millet Pea wheat Urd Rape seed & mustard	Irrigation Frost resistant varieties to be selected Raised nursery About 50% more seedlings to be raised	irrigation irrigation irrigation	irrigation irrigation irrigation	
Horticulture				
Mandarin Other fruits	Protected by shade net Irrigation Raised nursery	Irrigation Replanting	Irrigation	Go for early harvest

	More seedlings to be planted	Planting of trees to act as wind break Staking of plants	Planting of trees (wind break)	
Cardamom	Protected by shade net and irrigation Raised nursery More seedlings to be planted			
Potato	Irrigation Frost resistant variety			
Vegetables	Protected in poly tunnel or poly house or shade house Raised nursery Frost resistant variety			
Other spices				
Hailstorm				
Maize	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised	Replanting Planting of trees to act as wind break Staking of plants	Planting of trees (wind break)	Go for early harvest
wheat				
Mustard				
Urd				
Rape & mustard				
Horticulture				
Vegetables	Use Hailstrom net Raised nursery More seedlings to be planted	Replanting Planting of trees to act as wind break Staking of plants	Planting of trees (wind break)	Go for early harvest
Orange	Use hailstorm net in nursery			
Cardamom	Use hailstorm net in nursery Raised nursery More seedlings to be planted			
Ginger				
Spices				
Cyclone				

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event[$]	**During the event**	**After the event**
Drought			
Feed and fodder availability	• Insurance • Cultivation of perennial fodder on bunds and waste land • Establishing fodder banks, encouraging fodder crops in irrigated area • Silage – using excess fodder for silage	• Utilizing fodder from perennial trees and fodder bank reserves • Utilizing fodder stored in silos • Transporting excess fodder from adjoining districts	• Availing Insurance • Culling of unproductive livestock
Drinking water	• Preserving water in the tank for drinking purpose • Water harvesting in Jalkund Structure	• Using preserved water in the tanks for drinking	
Health and disease management	• Veterinary preparedness with medicines and vaccines	• Conducting mass animal Health Camps and treating the affected ones in the campaign	• Culling sick / unproductive animals
Floods	NA		
Cyclone	NA		
Cold wave			
Shelter/environment management	• Construction of animal house preferably with wooden plank flooring with the provision of a well-protected half wall surrounding the house to protect the livestock from direct effect of cold.	• Renovation of existing animal house. • Floor should always be kept clean and dry. • Use of gunny bags for covering the uncovered portion of the side wall	

	• Selection of site that allows good wind control is preferable.	during night	
Health and disease management	Veterinary preparedness with medicines and vaccines	Balanced feeding. Supplementation of vitamin and mineral mixtures. Vaccination and animal health camp.	Culling of affected animals
Any other i. Landslide ii. Earthquake	• Cultivation of broom grass, napier, bamboo etc		

2.5.2 Poultry

	Suggested contingency measures			**Convergence/linkages with ongoing programs, if any**
	Before the event[a]	**During the event**	**After the event**	
Drought				
Shortage of feed ingredients	Insurance & Integration Establishing feed serve bank	Utilizing from feed serve banks	Availing insurance Strengthening the feed serve Banks	
Drinking water	Rain water harvesting/ Jalkund	Utilising the stored water		
Health and disease management	Emergency Veterinary preparedness with medicines, vaccination for treatment	Campaign and Mass Vaccination	Culling affected birds	

Housing management	Heat insulation of roof walls			
Floods				
Cyclone				
Cold wave				
Shelter/environment management	Insurance Create scientific brooding facilities for chicks Keep in stock, dried locally available litter materials like saw dust, paddy husk, etc Heat insulation	Improved brooding practices Maintain brooding temperature through continuous electricity supply	Culling & disposal of sick birds	
Health and disease management	Veterinary preparedness with medicines and vaccines	Urgent vaccination and quarantine of affected birds Supplementation of vitamins		

2.5.3 Fisheries/ Aquaculture : Not applicable

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
1) Drought			
A. Capture			
B. Aquaculture			

2) Floods			
A. Capture			
B. Aquaculture			
3. Cyclone / Tsunami			
4. Heat wave and cold wave			