

State: **SIKKIM**

Agriculture Contingency Plan for District: WEST 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) | Temperate humid ESR with shallow to medium deep loamy brown and red hills soils, low to medium AWC and 300 days | | |
| | List all the districts or part thereof falling under the NARP Zone | East Sikkim (Gangtok) | | |
| | Geographic coordinates of district headquarters | Latitude | Longitude | Altitude |
| | | 27° 06 18 N-27° 40 40 N | 88° 01 00 E- 88° 21 40 E | 2800 mt |
| | Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS | ICAR Research Complex for NEH Region, Sikkim Center, Tadong, Gangtok NRC on Orchid, Pakyong ICRI Regional Research Station, Spices board, Tadong CAEPHT, CAU, Ranipool, Gangtok | | |
| | Mention the KVK located in the district | Gyaba, Gyalshing, West Sikkim 737111 Email: kvk_gyaba@yahoo.co.in , Phone/Fax: 03595251111 | | |

| 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) | 1963.7 | | 1 st week of June | 4 th week of September |
| | NE Monsoon(Oct-Dec) | 199.6 | | 3 rd week of October | 1 st week of December |
| | Winter (Jan- March) | 184.17 | | 1 st week of January | 4 th week of March |
| | Summer (Apr-May) | 711 | | 2 nd week of April | 4 th week of May |
| | Annual | 3058.47 | | | |

| | | | | | | | | | | | |
|------------|---|-----------------------------|---------------------------|-----------------------|---|------------------------------|--------------------------------|--|--|---------------------------|-------------------------|
| 1.3 | Land use pattern of the district (latest statistics) | Geographical area ('000 ha) | Cultivable area ('000 ha) | Forest area ('000 ha) | Land under non-agricultural use ('000 ha) | Permanent Pastures ('000 ha) | Cultivable wasteland ('000 ha) | Land under Misc. tree crops and groves ('000 ha) | Barren and uncultivable land ('000 ha) | Current Fallows ('000 ha) | Other fallows ('000 ha) |
| | Area ('000 ha) | 116.6 | 16.6 | 83.473 | 0.847 | | | | 3.392 | | 12.239 |

| 1.4 | Major Soils | Area ('000 ha) | Percent (%) of total |
|------------|--------------------|-----------------------|-----------------------------|
| | Entisols | | |
| | Molissols | | |
| | Ultisols | | |
| | Histosols | | |

| 1.5 | Agricultural land use | Area ('000 ha) | Cropping intensity % |
|------------|------------------------------|-----------------------|-----------------------------|
| | Net sown area | 16.6 | 178 |
| | Area sown more than once | - | |
| | Gross cropped area | 29.6 | |

| | | | | |
|--|--|-----------------------------------|-----------------------|----------------------------------|
| 1.6 | Irrigation | Area ('000 ha) | | |
| | Net irrigated area | 2.054 | | |
| | Gross irrigated area | | | |
| | Rainfed area | | | |
| | Sources of Irrigation | Number | Area ('000 ha) | % of total irrigated area |
| | Canals | | | |
| | Tanks | | | |
| | Open wells | | | |
| | Bore wells | | | |
| | Lift irrigation schemes | | | |
| | Micro-irrigation channel | 30 | | |
| | Other sources (please specify) | | | |
| | Catch water Drain | 7 | | |
| | Government Channel | 68 | | |
| | Private channel | 75 | | |
| | Total Irrigated Area | | | |
| | Pump sets | | | |
| | No. of Tractors | | | |
| | Groundwater availability and use* | No. of blocks/ Tehsils | (%) area | Quality of water |
| | 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 (as per latest figures) (2008-09)

| 1.7a | Major field crops cultivated | Area ('000 ha) | | | | | | | |
|---|------------------------------|----------------|---------|-------|-------------|---------|-------|--------|-------------|
| | | <i>Kharif</i> | | | <i>Rabi</i> | | | Summer | Grand total |
| | | Irrigated | Rainfed | Total | Irrigated | Rainfed | Total | | |
| Maize | - | 12.88 | 12.88 | | - | | | 12.88 | |
| Rice | 4.19 | | 4.19 | | | | | 4.19 | |
| Blackgram | | 1.40 | 1.40 | | | | | 1.40 | |
| Fingermillet | - | 0.78 | - | | - | | | 0.78 | |
| Buck Wheat | | | | | 2.16 | 2.16 | | 2.16 | |
| Rape and Mustard | | | | | 1.61 | 1.61 | | 1.61 | |
| Wheat | | | | 1.02 | - | 1.02 | | 1.02 | |
| Barley | | | | | 0.50 | 0.50 | | 0.50 | |
| Other Pulses | 0.31 | | 0.31 | | - | | | 0.31 | |
| Source: Food Security and Agriculture Development Department, Government of Sikkim, Annual Report 2008-09 | | | | | | | | | |

| 1.7b | Horticulture crops – Fruits | Area ('000 ha) 2006-07 | | |
|------|-----------------------------|------------------------|----------------|--------------|
| | | Total | Irrigated | Rainfed |
| | Orange | 2.32 | | 2.32 |
| | Other Fruits | 0.9 | - | 0.9 |
| 1.7c | Horticulture crops - | Total area ('000 ha) | Irrigated area | Rainfed area |

| | | | | |
|--|-------------------------|------|------|------|
| | Vegetables | | | |
| | Rabi vegetables | 0.96 | 0.96 | - |
| | Kharif vegetables | 0.91 | 0.91 | - |
| | Vegetable (off-season) | 0.87 | 0.39 | |
| | Potato | 3.26 | - | 3.26 |
| | Other roots and tubers | 0.12 | - | 0.12 |

Source: Horticulture and Cash crop Development Department, Government of Sikkim, Annual Report (2006-07)

| 1.7d | Medicinal and Aromatic crops | Total area ('000 ha) | Irrigated area | Rainfed area |
|-------------|-------------------------------------|-----------------------------|-----------------------|---------------------|
| 1.7e | Plantation/ Spices crops | - | - | - |
| | Large Cardamom | 2.39 | 2.39 | - |
| | Ginger | 1.98 | - | 1.98 |
| | Turmeric | 0.18 | - | 0.18 |
| 1.7f | Fodder crops | - | - | - |
| 1.7g | Grazing land | - | - | - |
| 1.7h | Sericulture etc | - | - | - |

| | | | | | | | |
|---------------------------------|---|-------------------------------|-------------------------------|---|------------------------------------|--|--------------------------------------|
| 1.8 | Livestock* | | Male ('000) | Female ('000) | Total ('000) | | |
| | Cattle : | | | | 45.339 | | |
| | 1.Jersey | | 6.781 | 13.785 | | | |
| | 2.HF | | 0.013 | 0.033 | | | |
| | 3.SIRI | | 10.491 | 14.236 | | | |
| | Buffalo | | 0.203 | 0.774 | 0.977 | | |
| | Yak | | 0.466 | 0.676 | 1.142 | | |
| | Pigs | | 8.952 | 4.334 | 13.286 | | |
| | Goat | | 20.225 | 25.007 | 45.232 | | |
| | Sheep: | | | | 1.917 | | |
| 1.Banpala | | 0.729 | 1.165 | | | | |
| 2.Graded | | 0.013 | 0.010 | | | | |
| Commercial dairy farms (Number) | | | | - | | | |
| 1.9 | Poultry | | No. of farms | Total No. of birds ('000) | | | |
| | Fowl | | | 71.243 | | | |
| | Poultry | | | 14.588 | | | |
| 1.10 | Fisheries | | | | | | |
| | A. Capture | | | | | | |
| | i) Reverine | 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) | |
| | | 211 | | | | | |
| | 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 | | | | | | |
| ii) Fresh water | | 7.5 | 3 | 0.035 | | | |
| Seed production | | 3.1 | | 6.5 lakhs fingerlings of carp and trout | | | |

*18th Livestock Census (2007-08), Dept. of AH, LF&VS

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

| 1.11 | Name of crop | Kharif | | Rabi | | Summer | | Total | | Crop residue as fodder ('000 tons) |
|--|------------------|---------------------|----------------------|---------------------|----------------------|---------------------|----------------------|---------------------|----------------------|------------------------------------|
| | | Production ('000 t) | Productivity (kg/ha) | Production ('000 t) | Productivity (kg/ha) | Production ('000 t) | Productivity (kg/ha) | Production ('000 t) | Productivity (kg/ha) | |
| Major Field crops (Crops identified based on total acreage) | | | | | | | | | | |
| | Rice | 7.262 | 1640 | | | | | 7.262 | 1640 | |
| | Maize | 21.76 | 1645 | | | | | 21.76 | 1645 | |
| | Finger Millet | 1.085 | 920 | | | | | 1.085 | 920 | |
| | pulses | 1.766 | 898 | | | | | 1.766 | 898 | |
| | Wheat | | | 2.296 | 1316 | | | 2.296 | 1316 | |
| | Barley | | | 0.384 | 1208 | | | 0.384 | 1208 | |
| | Buckwheat | | | 2.13 | 986 | | | 2.13 | 986 | |
| | Rape and mustard | | | 0.608 | 721 | | | 0.608 | 721 | |
| | Soybean | 0.476 | 822 | | | | | 0.476 | 822 | |

| Major Horticultural crops (Crops identified based on total acreage) (2007-08) | | | | | | | | | | |
|--|---------|--|--|--|--|--|--|-------|------|--|
| | Orange | | | | | | | 3.43 | 1414 | |
| | Passion | | | | | | | 0.087 | 174 | |

| | | | | | | | | | | |
|--|-----------------------|-------|------|-------|------|--|--|---------|------|--|
| | fruits | | | | | | | | | |
| | Other Fruits | | | | | | | 1.45 | 1576 | |
| | Vegetables | 4.579 | 4556 | 4.677 | 4493 | | | 9.246 | 4524 | |
| | Off-season vegetables | | | | | | | 5.479 | 4715 | |
| | Potato | | | | | | | 14.2428 | 4325 | |
| | Large Cardamom | | | | | | | 0.575 | 230 | |
| | Ginger | | | | | | | 11.235 | 5350 | |
| | Flowers | | | | | | | 5.792 | | |

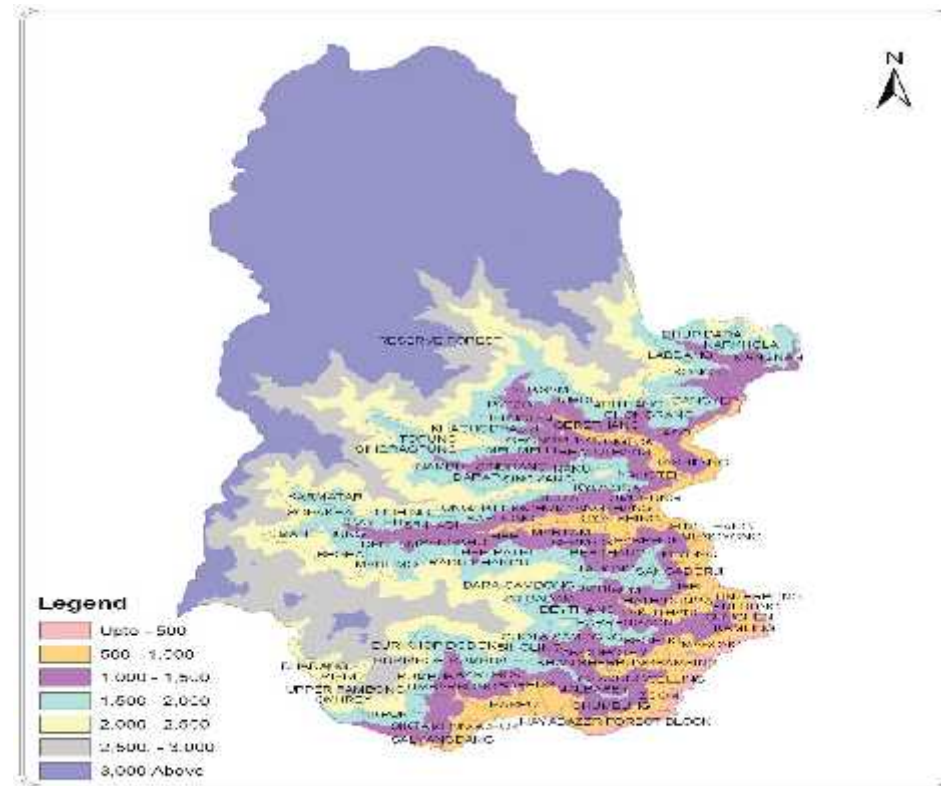
| 1.12 | Sowing window for 5 major field crops | Maize | Rice | Blackgram | Wheat | Rape and Mustard |
|------|---------------------------------------|---|--|--|----------------------|---|
| | Kharif- Rainfed | July to August | | 3 rd week of June to 1 st week of August | | - |
| | Kharif-Irrigated |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

| 1.13 | What is the major contingency the district is prone to? (Tick mark) | Regular | Occasional | None |
|------|---|---------|------------|------|
| | Drought | | | |
| | Flood | | | |
| | Cyclone | | | |
| | Hail storm | | | |

| | | | | |
|--|----------------------------|--|--|--|
| | Heat wave | | | |
| | Cold wave | | | |
| | Frost | | | |
| | Sea water intrusion | | | |
| | Pests and disease outbreak | | | |

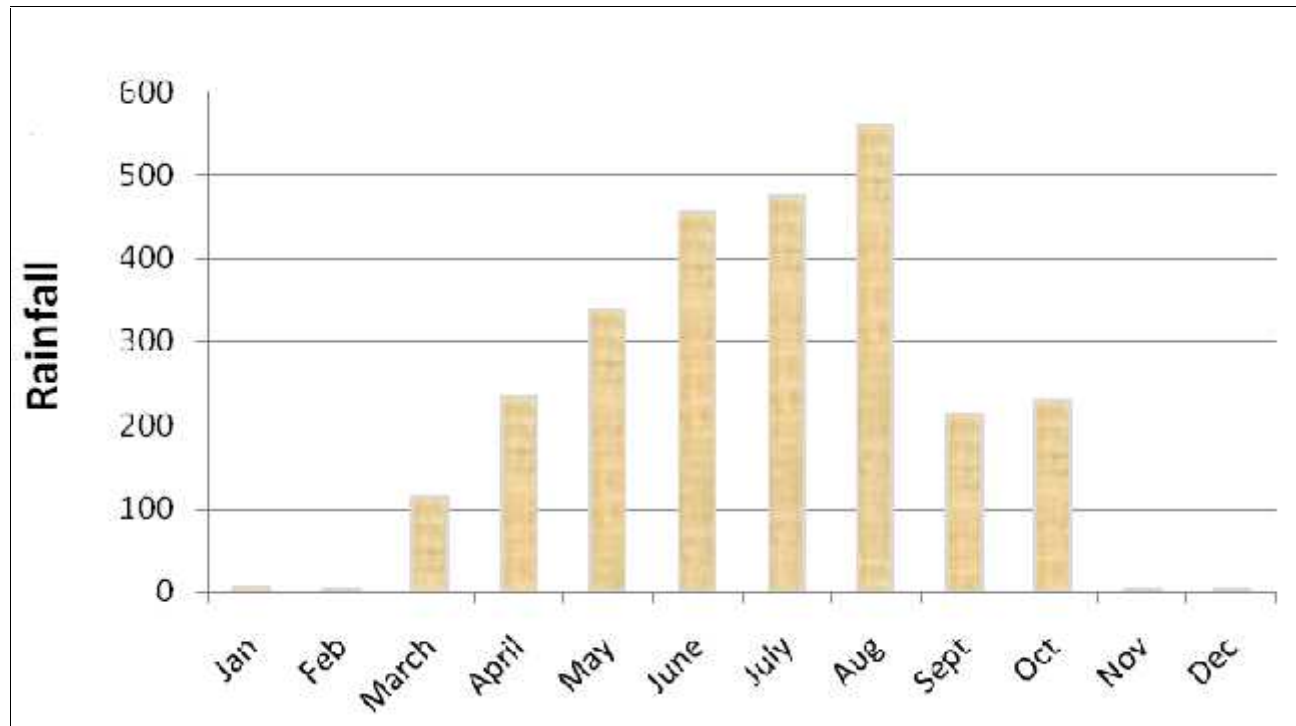
| | | | |
|-------------|---|---|---------------|
| 1.14 | Include Digital maps of the district for | Location map of district within State as Annexure I | Enclosed: Yes |
| | | Mean annual rainfall as Annexure II | Enclosed: Yes |
| | | Soil map as Annexure III | Enclosed: Yes |

Annexure I

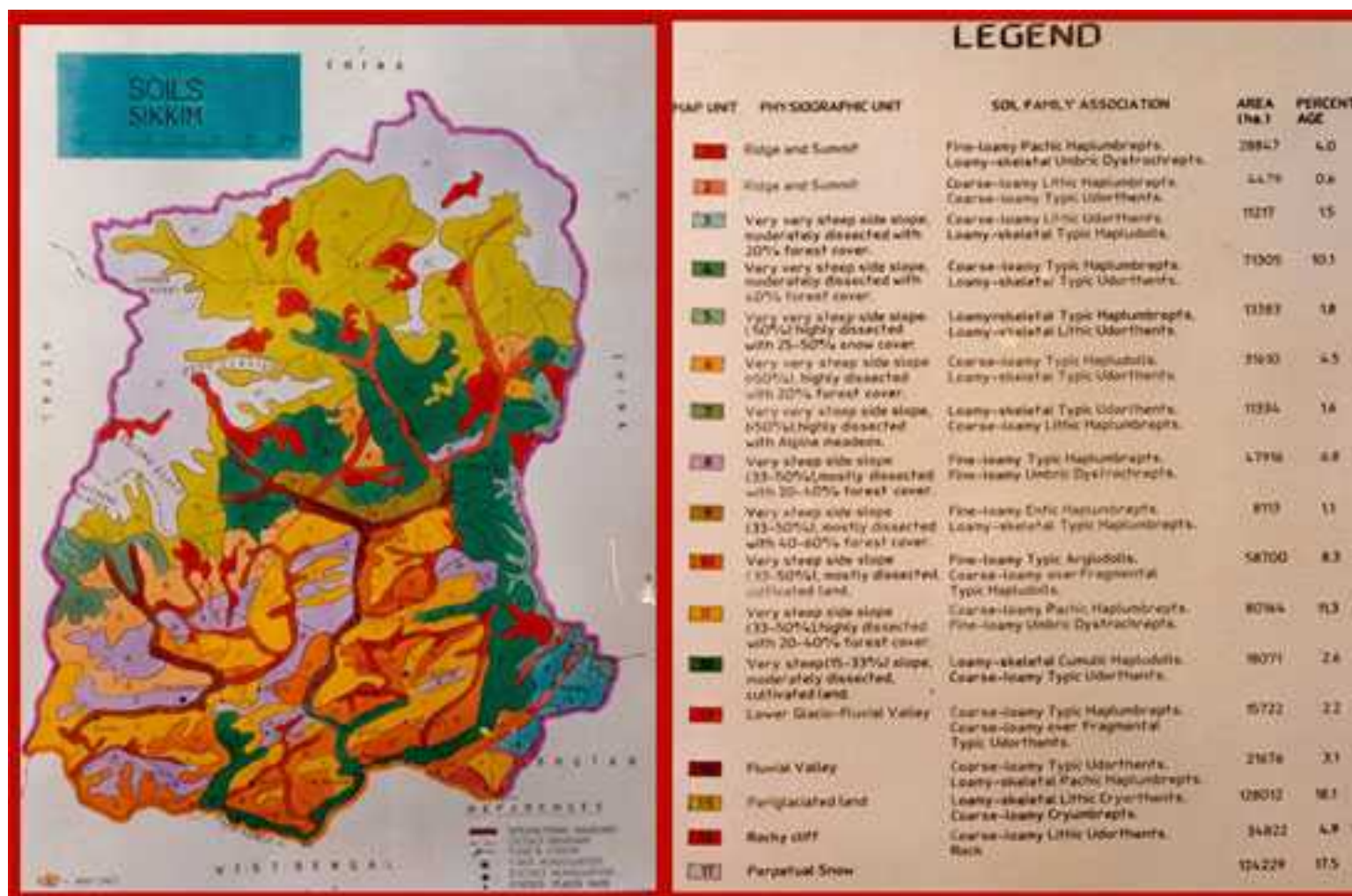


Digital Map of West Sikkim Showing the Altitudinal gradient

Annexure II: Mean Annual Rainfall of West Sikkim (2009)



Annexure III : SOIL MAP OF WEST SIKKIM



Source: Department of Agriculture Govt. of Sikkim

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

| Condition | Major Farming situation | Normal Crop / Cropping system | Suggested Contingency measures | | |
|--|-------------------------|--|--|--|--|
| | | | Change in crop / cropping system including variety | Agronomic measures | Remarks on Implementation |
| Delay by 2 weeks 3 rd week of June | Rainfed | 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 5. Rice - Wheat/Barley/ Mustard/Vegetables 6. Perennials crops –Mandarin orange, other fruits, Cardamom 7. Ginger 8. Turmeric | No change | Wider spacing (60 X 30 cm) for maize Thinning to retain one seedling at 30 cm Transplanting of rice should be completed by mid week of July In case of early withdrawl of rain, short duration varieties should be selected | Supply of seeds through NSC, State agriculture and horticulture department, SAUs |

| Condition | Major Farming situation | Normal Crop / Cropping system | Suggested Contingency measures | | |
|--|-------------------------|--|--|---|--|
| | | | Change in crop / cropping system including variety | Agronomic measures | Remarks on Implementation |
| Early season drought (delayed onset) Delay by 4 weeks 1 st week of July | Rainfed | 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 5. Rice - Wheat/Barley/ Mustard/Vegetables 6. Perennials crops –Mandarin orange, other fruits, Cardamom 7. Ginger 8. Turmeric | Maize: HQPM-I, RCM 1- 1, RCM 1-2, RCM 1-3, Madhuri, Vivek Maize Hybrid 15, Vivek Hybrid 9, Vivek Maize Hybrid 23, Vivek Sankul Makka 11. Rice: Bali, Joli, Kalinga-3, Aditya, Heera, Jawahar, BG 367-7, Diwani, VL 4930, VL 30218, PD-10, VL Dhan 61, VL-62, VL Dhan 65, VL Dhan 86, VL Dhan 209, VL-206, KRH-2, Krishnabhog, Satyaranjan, Shah Sarang-1, DR-92, Pant Dhan 10 Local variety (Attay, Marsi etc.) Soybean: Ahilya-1, PK 327, PK 472, PK-1042, PK-1024, JS-80-21, JS-335, JS 75-46, PK 262, NRC 37, VL Soya 47. | Wider spacing (60 X 30 cm) of maize Thinning to retain one seedling at 30cm Intercultivation (in broadcasting) SRI/ ICM method of paddy cultivation (spacing 20x20 cm) In case of early withdrawal of rain, short duration varieties should be selected | Supply of seeds through NSC, State agriculture and horticulture department, ATMA, SAUs |

| Condition | Major Farming situation | Normal Crop / Cropping system | Suggested Contingency measures | | |
|--|-------------------------|---|--|--|--|
| | | | Change in crop / cropping system including variety | Agronomic measures | Remarks on Implementation |
| Early season drought (delayed onset) Delay by 6 weeks 1 st week of August | Rainfed | Maize based cropping system : 1. Maize - rice/soybean - potato/vegetables/ wheat/mustard 2. Maize - Maize + French Beans (Local)/vegetables 3. Ginger + Maize | Maize: HQPM-I, RCM 1- 1, RCM 1-2, RCM 1-3, Madhuri, Vivek Maize Hybrid 15, Vivek Hybrid 9, Vivek Maize Hybrid 23, Vivek Sankul Makka 11. Rice: Bali, Joli, Kalinga-3, Aditya, Heera, Jawahar, BG 367-7, Diwani, VL 4930, VL | Wider spacing (60 X 30) cm for maize Thinning to retain one seedling at 30 cm | Supply of seeds through NSC, State agriculture and |

| | | | | | |
|--|--|--|--|---|--|
| | | <p>4. Maize - Finger Millet/ Rice Bean (Relay) + vegetable</p> <p>5. Rice - Wheat/Barley/ Mustard/Vegetables</p> <p>6. Perennials crops –Mandarin orange, other fruits, Cardamom</p> <p>7. Ginger</p> <p>8. Turmeric</p> | <p>30218, PD-10, VL Dhan 61, VL-62, VL Dhan 65, VL Dhan 86, VL Dhan 209, VL-206, KRH-2, Krishnabhog, Satyaranjan, Shah Sarang-1, DR-92, Pant Dhan 10.</p> <p>Soybean: Ahilya-1, PK 327, PK 472, PK-1042, PK-1024, JS-80-21, JS-335, PK 262, NRC 37, VL Soya 47.</p> | <p>Intercropping of pulses with maize</p> <p>SRI/ ICM method of paddy cultivation (spacing 20x20 cm)</p> <p>Frequent intercultural operation for moisture conservation</p> <p>Crops should be mulched with green leaves</p> <p>Short duration crops (80-90 days) should be selected</p> | <p>horticulture department, ATMA, SAUs</p> |
|--|--|--|--|---|--|

| Condition | Major Farming situation | Normal Crop / Cropping system | Suggested Contingency measures | | |
|--|-------------------------|--|---|--|--|
| | | | Crop management | Soil nutrient & moisture conservation measures | Remarks on Implementation |
| Early season drought (Normal onset) | | | | | |
| Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc. | Rainfed | 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 5. Rice - Wheat/Barley/ Mustard/Vegetables 6. Perennials crops –Mandarin orange/ other fruits, cardamom 7. Ginger 8. Turmeric | Maize: HQPM-I, RCM 1- 1, RCM 1-2, RCM 1-3, Madhuri, Vivek Maize Hybrid 15, Vivek Hybrid 9, Vivek Maize Hybrid 23, Vivek Sankul Makka 11. Rice: Bali, Joli, Kalinga-3, Aditya, Heera, Jawahar, BG 367-7, Diwani, VL 4930, VL 30218, PD-10, VL Dhan 61, VL-62, VL Dhan 65, VL Dhan 86, VL Dhan 209, VL-206, KRH-2, Krishnabhog, Satyaranjan, Shah Sarang-1, DR-92, Pant Dhan 10. | Furrow application of FYM Mulching with green/dry leaves & grasses Wider spacing (60 X 30cm) for maize Frequent intercultural operation for moisture conservation | Supply of seeds through State agriculture and horticulture department ,NSC, ATMA, SAUs |

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

| | | | | | |
|---------------------|---------|--|---|--|--|
| At vegetative stage | Rainfed | <p>Maize based cropping system :</p> <ol style="list-style-type: none"> 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 5. Rice - Wheat/Barley/ Mustard/Vegetables 6. Perennials crops – Mandarin orange/ other fruits/ cardamom 7. Ginger 8. Turmeric | <p>Maize: HQPM-I, RCM 1- 1, RCM 1-2, RCM 1-3, Madhuri, Vivek Maize Hybrid 15, Vivek Hybrid 9, Vivek Maize Hybrid 23, Vivek Sankul Makka 11.</p> <p>Rice: Bali, Joli, Kalinga-3, Aditya, Heera, Jawahar, BG 367-7, Diwani, VL 4930, VL 30218, PD-10, VL Dhan 61, VL-62, VL Dhan 65, VL Dhan 86, VL Dhan 209, VL-206, KRH-2, Krishnabhog, Satyaranjan, Shah Sarang-1, DR-92, Pant Dhan 10.</p> <p>Soybean: Ahilya-1, PK 327, PK 472, PK-1042, PK-1024, JS-80-21, JS-335, JS 75-46, PK 262, NRC 37, VL Soya 47.</p> | <p>Furrow application of FYM</p> <p>Mulching with green/dry leaves & grasses</p> <p>Wider spacing (60 X 30) for maize</p> <p>In-situ soil moisture conservation measures</p> <p>Frequent intercultural operation for moisture conservation</p> | <p>Supply of seeds through NSC, ATMA, SAUs</p> |
|---------------------|---------|--|---|--|--|

| Condition | Major Farming situation | Normal Crop / Cropping system | Suggested Contingency measures | | |
|-------------------------------------|-------------------------|-------------------------------|--------------------------------|--|---------------------------|
| | | | Crop management | Soil nutrient & moisture conservation measures | Remarks on Implementation |
| Mid season drought (long dry spell) | | | | | |

| | | | | | |
|---------------------------------|---------|--|---|--|---|
| At flowering/ fruiting stage | Rainfed | 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 5. Rice - Wheat/Barley/ Mustard/Vegetables 6. Perennials crops –Mandarin orange/ other fruits/ cardamom 7. Ginger 8. Turmeric | Maize: HQPM-I, RCM 1- 1, RCM 1-2, RCM 1-3, Madhuri, Vivek Maize Hybrid 15, Vivek Hybrid 9, Vivek Maize Hybrid 23, Vivek Sankul Makka 11. Rice: Bali, Joli, Kalinga-3, Aditya, Heera, Jawahar, BG 367-7, Diwani, VL 4930, VL 30218, PD-10, VL Dhan 61, VL-62, VL Dhan 65, VL Dhan 86, VL Dhan 209, VL-206, KRH-2, Krishnabhog, Satyaranjan, Shah Sarang- 1, DR-92, Pant Dhan 10. Soybean: Ahilya-1, PK 327, PK 472, PK- 1042, PK-1024, JS-80-21, JS-335, JS 75- 46, PK 262, NRC 37, VL Soya 47 | Furrow application of FYM Mulching with green/dry leaves & grasses Wider spacing (60 X 30 cm) for maize In-situ soil moisture conservation measures Frequent intercultural operation for moisture conservation | Supply of seeds through NSC, ATMA, SAUs |
|---------------------------------|---------|--|---|--|---|

| Condition (Terminal drought) | Major Farming situation | Normal Crop / Cropping system | Suggested Contingency measures | | |
|-------------------------------------|----------------------------|---|--|---|---|
| | | | Crop management | Rabi Crop planning | Remarks on Implementation |
| (Early withdrawal of monsoon) | Rainfed | 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 5. Rice - Wheat/Barley/ Mustard/Vegetables 6. Perennials crops –Mandarin orange/ other fruits/ cardamom 7. Ginger 8. Turmeric | Maize: HQPM-I, RCM 1- 1, RCM 1-2, RCM 1-3, Madhuri, Vivek Maize Hybrid 15, Vivek Hybrid 9, Vivek Maize Hybrid 23, Vivek Sankul Makka 11. Rice: Bali, Joli, Kalinga-3, Aditya, Heera, Jawahar, BG 367-7, Diwani, VL 4930, VL 30218, PD-10, VL Dhan 61, VL-62, VL Dhan 65, VL Dhan 86, VL Dhan 209, VL- 206, KRH-2, Krishnabhog, Satyaranjan, Shah Sarang-1, DR-92, Pant Dhan 10. Soybean: Ahilya-1, PK 327, PK 472, PK- 1042, PK-1024, JS-80-21, JS-335, JS 75-46, PK 262, NRC 37, VL Soya 47. | In-situ soil moisture 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 | Supply of seeds through NSC, ATMA, SAUs |

2.1.2 Drought - Irrigated situation

| Condition | Major Farming situation | Suggested Contingency measures | | |
|--|-------------------------|--------------------------------|--------------------------------|--------------------|
| | | Normal Crop/cropping system | Change in crop/cropping system | Agronomic measures |
| Delayed release of water in canals due to low rainfall | | Not Applicable | | |
| Limited release of water in canals due to low rainfall | | Not Applicable | | |

| | | | | |
|--|--|----------------|--|--|
| Non release of water in canals under delayed onset of monsoon in catchment | | Not Applicable | | |
| Lack of inflows into tanks due to insufficient /delayed onset of monsoon | | Not Applicable | | |
| Insufficient groundwater recharge due to low rainfall | | Not Applicable | | |

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

| Condition | Suggested contingency measure | | | |
|--|----------------------------------|---|---|--|
| | Vegetative stage | Flowering stage | Crop maturity stage | Post harvest |
| Continuous high rainfall in a short span leading to water logging | | | | |
| Field crops | | | | |
| Maize | Ridge planting, Provide drainage | Provide drainage | Drain out excessive water, Harvesting at physiological maturity stage | Dry and store in air tight condition |
| Rice | Drain out excessive water | Drain out excessive water | | |
| Wheat | | | | |
| Finger-Millet | | | | |
| Blackgram | Ridge planting, Provide drainage | Provide drainage | | |
| Rapeseed & Mustard | | | | |
| Soybean | | | | |
| Horticultural crops | | | | |
| Mandarin | Provide drainage | Application of PGRs, (Auxin) and boron to enhance fruit set | Drain out excessive water and harvest the crop at maturity. | |
| Other fruits | | | | |
| <i>Rabi</i> vegetables | Ridge planting, Provide drainage | Provide drainage | Drain out excessive water and harvest the crop at optimum stage. | Store at optimum temperature and packed properly |
| <i>Kharif</i> vegetables | | | | |
| Off season vegetables | | | | |
| Cardamom | Provide drainage | Optimize population of pollinator | Drain out excessive water and harvest the crop at physiological maturity stage. | Dry and store in air tight condition |
| Ginger | Ridge planting, Provide drainage | Provide drainage | | |
| Turmeric | | | | |
| Other spices | | | | |

| Heavy rainfall with high speed winds in a short | Vegetative stage | Flowering stage | Crop maturity stage | Post harvest |
|---|------------------|-----------------|---------------------|--------------|
|---|------------------|-----------------|---------------------|--------------|

| span | | | | |
|----------------------------|----------------------------------|---|--|--|
| Field crops | | | | |
| Maize | Ridge planting, Provide drainage | Provide drainage | Drain out excessive water, Harvesting at physiological maturity stage | Dry and store in air tight condition |
| Rice | Drain out excessive water | Drain out excessive water | | |
| Wheat | | | | |
| Finger millet | | | | |
| Blackgram | Ridge planting, Provide drainage | Provide drainage | Drain out excessive water, Harvesting at physiological maturity stage | Dry and store in air tight condition |
| Rapeseed & Mustard | | | | |
| Soybean | | | | |
| Horticultural crops | | | | |
| Mandarin | Provide drainage | Application of PGRs, (Auxin) and boron to enhance fruit set | Drain out excess water and harvest the crop at maturity. | |
| Other fruits | | | | |
| Rabi vegetables | Ridge planting, Provide drainage | Provide drainage | Drain out excess water and harvest the crop at optimum stage. | Store at optimum temperature and packed properly |
| Kharif vegetables | | | | |
| Off season vegetables | | | | |
| Cardamom | Provide drainage | Optimize population of pollinator | Drain out excess water and harvest the crop at physiological maturity stage. | Dry and store in air tight condition |
| Ginger | Ridge planting, Provide drainage | Provide drainage | | |
| Turmeric | | | | |
| Other spices | | | | |

| Outbreak of pests and diseases due to unseasonal rains | Vegetative stage | Flowering stage | Crop maturity stage | Post harvest |
|---|----------------------------------|----------------------------------|----------------------------|--|
| Field crops | | | | |
| Maize | Disease resistant varieties, | Need based plant protection IPDM | | Safe storage against storage pest and diseases |
| Rice | Need based plant protection IPDM | | | |
| Wheat | | | | |
| Fingermillet | | | | |

| | | | | |
|----------------------------|--|---|-------------------------------------|--|
| Blackgram | | | | |
| Rapeseed & Mustard | | | | |
| Soybean | | | | |
| Horticultural crops | | | | |
| Mandarin | Need based plant protection IPDM | Need based plant protection IPDM | | Safe storage against storage pest and diseases |
| Other fruits | | | | |
| <i>Rabi</i> vegetables | <ul style="list-style-type: none"> • Disease resistant varieties, • Need based plant protection IPDM, • Crop rotation | <ul style="list-style-type: none"> • Bio control agents, • Need based plant protection IPDM | Harvest the crops at maturity stage | Safe storage against storage pest and diseases |
| <i>Kharif</i> vegetables | | | | |
| Off season vegetables | | | | |
| Cardamom | | | | |
| Ginger | | | | |
| Turmeric | | | | |
| Other spices | | | | |

2.3 Floods:

| Condition | Suggested contingency measure | | | |
|---|-------------------------------|------------------|--------------------|------------|
| | Seedling / nursery stage | Vegetative stage | Reproductive stage | At harvest |
| Transient water logging/ partial inundation | | | | |
| Continuous submergence for more than 2 days | Not Applicable | | | |
| Sea water intrusion | | | | |

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 | | | | |
| Horticulture | | | | |

| | | | | |
|---------------------|--|---|---|-------------------------|
| Orange | Shade net | | | |
| Cold wave | | | | |
| Mustard | Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised. | <ul style="list-style-type: none"> Planting of trees around field to act as wind break and replanting of damaged plants Application of K to enhance tenacity in plants Staking of plants | Planting of trees around field to act as wind break | Early harvest the crops |
| Maize | | | | |
| wheat | | | | |
| Rice | | | | |
| Rapeseed | | | | |
| Soybean | | | | |
| Horticulture | Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised. | <ul style="list-style-type: none"> Planting of trees around field to act as wind break and replanting of damaged plants, Application of K to enhance tenacity in plants, Staking of plants | Planting of trees around field to act as wind break | Early harvest the crops |
| Cardamom | | | | |
| Orange | | | | |
| Potato | | | | |
| Vegetables | | | | |
| Frost | | | | |
| Mustard | Provide irrigation, grow frost resistant variety | Provide irrigation | | |
| Pea | Provide irrigation, grow frost resistant variety | Provide irrigation | | |
| wheat | Provide irrigation, grow frost resistant variety | Provide irrigation | | |
| Horticulture | | | | |
| Cardamom | Protected by shade net and Provide irrigation | Provide drainage | | |
| Orange | Protected by shade net and Provide irrigation | Irrigation, smoke around the orchard | Smoke around the orchard | |
| Potato | Sprinkler irrigation | Provide drainage | | |

| | | | | |
|---------------------|---|------------------|--|--|
| Vegetables | Protected in poly tunnel or poly house or shade house | Provide drainage | | |
| Hailstorm | Not Applicable | | | |
| Horticulture | | | | |
| vegetable | Use Hailstrom net | | | |
| orange | Use hailstorm net in nursery | | | |
| Cardamom | Use hailstorm net in nursery | | | |
| Cyclone | Not Applicable | | | |

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 Encourage perennial fodder on bunds and waste land Silage – using excess fodder for silage | Utilizing fodder from perennial trees Utilizing fodder stored in silos Transporting excess fodder from adjoining districts Use of feed mixtures | Availing Insurance |
| Drinking water | Preserving water in the tank for drinking purpose Water harvesting in Jalkund Structure | Using preserved water in the tanks for drinking wherever ground water resources are available priority for drinking purpose | |
| Health and disease management | Veterinary preparedness with medicines and vaccines | Conducting mass animal Health Camps and treating the affected once in Campaign | Culling sick animals |

| | | | |
|--------------------------------|--|--|--|
| Floods | Not Applicable | | |
| Cyclone | Not Applicable | | |
| Heat wave and cold wave | | | |
| Shelter/environment management | Awareness to the farmers about the management during the cold wave | Animal reared in open to the shifted to the shelter and the shelter are to be made warm by preventing the cold waves for eg. Using gunny bags etc. | |
| Health and disease management | Awareness to the farmers about the management during the cold wave | | |

2.5.2 Poultry

| | Suggested contingency measures | | | Convergence/linkages with ongoing programs, if any |
|-------------------------------|--|---------------------------------|--|--|
| | Before the event | During the event | After the event | |
| Drought | Insurance | Utilizing from feed serve banks | Availing insurance Strengthening feed Reserve Banks | |
| Shortage of feed ingredients | | | | |
| Drinking water | Emergency Veterinary preparedness with medicines vaccination to birds | Campaign and Mass Vaccination | Culling affected birds | |
| Health and disease management | | | | |

| | | | | |
|--------------------------------|---|--|--|--|
| Floods | Not Applicable | | | |
| Cyclone | Not Applicable | | | |
| Heat wave and cold wave | | | | |
| Shelter/environment management | Heat insulation in shelter/ housing management | | | |
| Health and disease management | | | | |

^a based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture

| | Suggested contingency measures | | |
|--|--|--|--|
| | Before the event ^a | During the event | After the event |
| 1) Drought | | | |
| A. Capture | | | |
| B. Aquaculture | | | |
| (i) Shallow water in ponds due to insufficient rains/inflow | Arrange for additional source of water Early harvest of the fish Insurance | Harvesting of the fish Digging the trenches in the mud tank Aeration | Avail insurance Seeding of fresh lot of fingerlings |
| (ii) Impact of salt load build up in ponds / change in water quality | | | |
| 2) Floods | Not Applicable | | |
| 3. Cyclone / Tsunami | Not Applicable | | |
| 4. Heat wave and cold wave | | | |
| A. Capture | | | |

| | | | |
|--|---|----------------------------------|-----------------|
| B. Aquaculture | | | |
| (i) Changes in pond environment (water quality) | Arrangement of the plastic protection over the pond Water of the pond with fresh water Insurance | Plastic cover over the fish pond | Avail insurance |
| (ii) Health and Disease management | | Salt Bath | |

^a based on forewarning wherever available