

State: Assam
Agriculture Contingency Plan for District: Jorhat

| 1.0 District Agriculture profile | | | |
|---|--|--|---------------------|
| 1.1 | Agro-Climatic/Ecological Zone | | |
| | Agro Ecological Sub Region (ICAR) | Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.4) | |
| | Agro-Climatic Zone (Planning Commission) | Eastern Himalayan Region (II) | |
| | Agro Climatic Zone (NARP) | Upper Brahmaputra Valley Zone (AS-2) | |
| | List all the districts or part thereof falling under the NARP Zone | Jorhat, Sivsagar, Golaghat, Tinsukia, Dibrugarh | |
| | Geographic coordinates of district headquarters | Latitude | Longitude |
| | | 20°10' N – 27°20' N | 93°37' E – 93°57' E |
| | Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS | RARS, Titabar | |
| | Mention the KVK located in the district | KVK, Jorhat, Kaliapani | |

| 1.2 | Rainfall | Normal RF(mm) | Normal Rainy days (number) | Normal Onset | Normal Cessation |
|------------|------------------------|----------------------|-----------------------------------|---------------------------|-----------------------------------|
| | SW monsoon (June-Sep): | 2100 | 119 | June 2 nd week | 4 th week of September |
| | NE Monsoon(Oct-Dec): | - | - | Oct 2 nd week | 3 rd week of December |
| | Winter (Jan- March) | 15 | 7 | | |
| | Summer (Apr-May) | 149 | 15 | | |
| | Annual | 2262 | 141 | | |

| | | | | | | | | | | | | |
|-----|--|-----------------------------|---------------------------|-----------------------|---|------------------------------|--------------------------------|--|--|---------------------------|-------------------------|----------------------------------|
| 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) | Land put or non agricultural use |
| | Area ('000 ha) | 368.8 | 152.90 | 28.54 | 71.7 | 4.4 | 41.57 | 6.7 | 27.8 | 34.87 | - | - |

| 1.4 | Major Soils | Area ('000 ha) | Percent (%) |
|-----|------------------|----------------|-------------|
| | Loam Soils | 12.50 | 8.16 |
| | Sandy loam Soils | 89.07 | 58.25 |
| | Sandy Soils | 15.17 | 9.92 |
| | Silty clay Soils | 23.54 | 15.40 |
| | Clay Soils | 12.62 | 8.26 |
| | Total | 152.9 | |

| 1.5 | Agricultural land use | Area ('000 ha) | Cropping intensity % |
|-----|--------------------------|----------------|----------------------|
| | Net sown area | 59.60 | 149.5 |
| | Area sown more than once | 93.3 | |
| | Gross cropped area | 152.9 | |

| 1.6 | Irrigation | Area ('000 ha) | | |
|-----|------------------------------|----------------|-----------------------|----------------------------------|
| | Net irrigated area | 4.5 | | |
| | Gross irrigated area | 5.51 | | |
| | Rainfed area | 147.58 | | |
| | Sources of Irrigation | Number | Area ('000 ha) | % of total irrigated area |

| | | | |
|--|---|-----------------|--|
| Canals | | | |
| Tanks | | | |
| Open wells | | | |
| Bore well | | | |
| Lift irrigation schemes | | | |
| Micro-irrigation | | | |
| Other sources (please specify) | | | |
| Total Irrigated Area | 5.51 | | |
| Pump sets | | | |
| No. of Tractors | 200 | | |
| 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 | None | | |
| Critical | None | | |
| Semi- critical | None | | |
| Safe | All blocks(8nos) | 2.81 | High iron, sporadic arsenic contamination |
| Wastewater availability and use | | | |
| Ground water quality | High iron, sporadic arsenic contamination | | |
| *over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70% | | | |

** information not available

1.7 Area under major field crops & horticulture

| 1.7 | Major field crops cultivated | Area ('000 ha) | | | | | | | |
|-----|------------------------------|----------------|---------|-------|-----------|---------|-------|--------|-------------|
| | | Kharif | | | Rabi | | | Summer | Grand total |
| | | Irrigated | Rainfed | Total | Irrigated | Rainfed | Total | | |
| | Winter Rice | - | 83.10 | 83.10 | - | - | - | - | 83.10 |
| | Blackgram | - | 21.89 | 21.89 | - | - | - | - | 21.89 |

| | | | | | | | | |
|-------------|---|------|------|------|-------|-------|------|-------|
| Greengram | - | 0.28 | 0.28 | - | - | - | - | 0.28 |
| Sugarcane | | 0.26 | 0.26 | | | | | 0.26 |
| Sesame | - | 0.07 | 0.07 | | | | | 0.07 |
| Wheat | - | - | - | NIL | 22.89 | 22.89 | | 22.89 |
| Rapeseed | - | - | - | - | 11.41 | 11.41 | - | 11.41 |
| Autumn Rice | - | - | - | - | - | - | 6.19 | 6.19 |
| Summer Rice | - | - | - | 2.70 | - | 2.70 | - | 2.70 |
| Potato | - | - | - | - | 3.18 | 3.18 | - | 3.18 |
| Pea | - | - | - | - | 1.41 | 1.41 | - | 1.41 |
| Lentil | | | | | 0.05 | | | 0.05 |

| Horticulture crops - Fruits | Total | Irrigated | Rainfed ('000 ha) |
|------------------------------------|--------------|------------------|--------------------------|
| Kharif Vegetables | 3.6 | - | 3.6 |
| Rabi Vegetables | 6.5 | 6.5 | - |
| Banana | 3.12 | - | 3.12 |
| Pineapple | 0.108 | - | 0.108 |
| Lemon | 0.9 | - | 0.9 |
| Medicinal and Aromatic crops | - | - | - |
| Plantation crops | | | |

| | | | |
|--------------|-------|---|------|
| Arecanut | 3.09 | - | 3.09 |
| Fodder crops | | | |
| Grazing land | 43.60 | - | - |

| 1.8 | Livestock (in number) | Male ('000) | Female ('000) | Total ('000) | | |
|------|--|-------------------------|----------------------------------|----------------|-------------|---|
| | Non descriptive Cattle (local low yielding) | - | - | 474.89 | | |
| | Crossbred cattle | - | - | 13.00 | | |
| | Non descriptive Buffaloes (local low yielding) | - | - | 13.94 | | |
| | Graded Buffaloes | - | - | - | | |
| | Goat | - | - | 170.00 | | |
| | Sheep | - | - | 0.33 | | |
| | Others (Camel, Pig, Yak etc.) | | | | | |
| | (i) Pig | - | - | 264.06 | | |
| | (ii) Mithun | - | - | - | | |
| | Commercial dairy farms (Number) | | | | | |
| 1.9 | Poultry | No. of farms | Total No. of birds ('000) | | | |
| | Commercial | | 27.96 | | | |
| | Backyard | | 1135.50 (including duck) | | | |
| 1.10 | Fisheries (Data source: Chief Planning Officer of district) | | | | | |
| | A. Capture | | | | | |
| | i) Marine (DataSource: Fisheries Department) | No. of fishermen | Boats | | Nets | Storage facilities (Ice plants etc.) |
| | | | Mechanized | Non-mechanized | | |
| | | | | | | |
| | Sericulture (plantation) | 0.780 | | | 0.780 | |

| | | | |
|---|--------------------------------|---|-----------------------------|
| ii) Inland (Data Source: Fisheries Department) | Farmer owned ponds (Ha) | Reservoirs (Beels, swamp area and wetlands) | No. of village tanks |
| | 607 ha | 28557 ha | NA |
| B. Culture | | | |
| | Water Spread Area (ha) | Yield (t/ha) | Production (tons) |
| i) Brackish water (Data Source: MPEDA/ Fisheries Department) | | - | - |
| ii) Fresh water (Data Source: Fisheries Department) | 42287 | 1.86 | 1518 |

1.11 Production and Productivity of major crops (Average of last 5 years: 2004 -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 | 249.28 | 3000 | 5.66 | 2094 | 15.47 | 2500 | 270.41 | 2531.33 | |
| | Wheat | | | 0.42 | 1200 | | | 0.42 | 1200 | |
| | Rapeseed | | | 9.7 | 850 | | | 9.7 | 850 | |
| | Green gram | 0.17 | 600 | | | | | 0.17 | 600 | |
| | Blackgram | 1.13 | 600 | | | | | 1.13 | 600 | |
| | Potato | | | 23.88 | 7500 | | | 23.88 | 7500 | |
| | Pea | | | 0.86 | 594 | | | 0.86 | 594 | |

| | | | | | | | | | | |
|--|-------------|-------|-------|-------|-------|------|------|--------|-------|--|
| | Sesame | 0.04 | 520 | - | - | | | - | 520 | |
| | Lentil | | | 0.03 | 520 | | | 0.03 | 520 | |
| | Sugarcane | 0.87 | 3375 | | | | | 0.87 | 3375 | |
| Major Horticultural crops (Crops identified based on total acreage) | | | | | | | | | | |
| | Vegetables | 52.68 | 15646 | 97.40 | 14785 | | | 150.08 | 15215 | |
| | Banana | 30.54 | 14293 | | | | | 30.54 | 14293 | |
| | Potato | | | 23.88 | 7500 | | | 23.88 | 7500 | |
| | Assam Lemon | 3.43 | 6525 | | | | | 3.43 | 6525 | |
| | Orange | | | 1.45 | 11954 | | | 1.45 | 11954 | |
| | Pineapple | 1.67 | 15488 | | | | | 1.67 | 15488 | |
| | Ginger | | | | | 2.95 | 6807 | 2.95 | 6807 | |
| | Turmeric | | | | | 0.13 | 630 | 0.13 | 630 | |
| | Chilli | 0.07 | 542 | | | | | 0.07 | 542 | |

| | | | | |
|-------------|--|----------------------|-----------------------------|--------------------------|
| 1.12 | Sowing window for 5 major field crops | Rice | Blackgram/ Greengram | Rapeseed/ mustard |
| | Kharif- Rainfed | June to July | March to April | |
| | Kharif-Irrigated | | | |
| | Rabi- Rainfed | | September to October | October to November |
| | Rabi-Irrigated | November to December | | |

| | | | | |
|-------------|--|-------------------------|----------------------------------|-------------|
| 1.13 | What is the major contingency the district is prone to? (Tick mark) | Regular | Occasional | None |
| | Drought | | ✓ | |
| | Flood | √ (20% of the district) | ✓ (10% of the district affected) | |
| | Cyclone | | ✓ | |
| | Hail storm | | ✓ | |

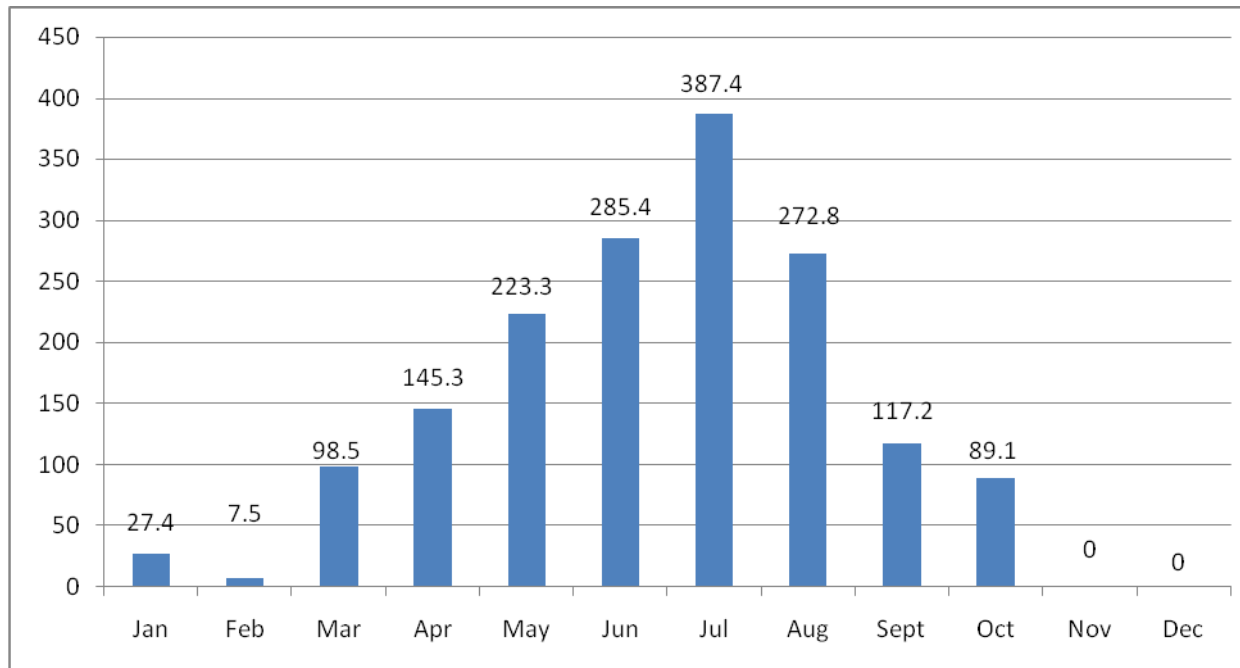
| | | | | |
|--|----------------------------|---|--|---|
| | Heat wave | | | ✓ |
| | Cold wave | | | ✓ |
| | Frost | | | ✓ |
| | Sea water intrusion | | | ✓ |
| | Pests and disease outbreak | ✓ | | |

| | | | |
|-------------|---|---|---------------|
| 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 |

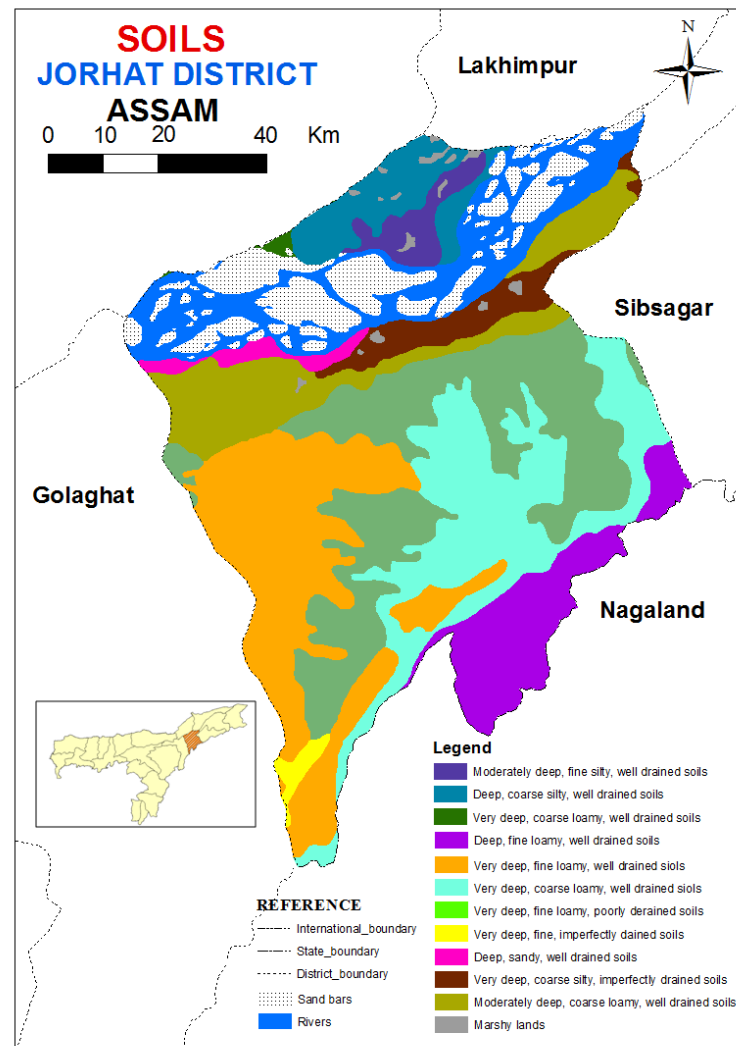
Annexure I



Annexure II
Month wise rainfall pattern



Annexure-III



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 |
| Early season drought (delayed onset) June 3 rd week Delay by 2 weeks | Medium and Low Land (High rainfall, loamy, sandy loam soil, acidic soil) | Rice | No change | Irrigate the seedbed | Collaboration with TM for Horticultural crops |
| | Upland (High rainfall, loamy, sandy loam soil, acidic soil) | Summer vegetables (standing crop) Var. Okra, Cucumber, Ridge gourd, Bitter gourd etc | No change | Irrigation, mulching | |
| | | Banana (standing crop) Var . Duarf cavendish, Borjahji, Malbhog | No change | Mulching, Drip Irrigation | |
| | | Lemon (standing crop) Var Assam lemon | No change | Drip Irrigation, mulching, spray of antitranspirants | |
| | Hill slope (High rainfall, sandy loam soil, slightly eroded acidic soil) | Orange var. Khashi Mandarin | No change | Mulching | |
| | | Pineapple var. Kew, Queen | No change | | |

| Condition | Major Farming situation | Normal Crop/cropping system | Suggested Contingency measures | | |
|--|-------------------------------------|-----------------------------|--------------------------------|---|---|
| | | | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Early season drought (delayed onset) Delay by 4 weeks | Medium and Low Land (High rainfall, | Rice | No change | Irrigate the seedbed and nursery raising in | Collaboration with TM for Hort crop, RKVY |

| | | | | | |
|---------------------------|---|-------------------|-----------|--|---|
| July 1 st week | loamy sandy loam soil, acidic soil) | | | community basis | Breeder seed RARS, Titabor, AAU, Jorhat |
| | Upland(High rainfall, loamy, sandy loam soil, acidic soil) | Summer vegetables | No change | Irrigation, mulching | |
| | | Banana | No change | Mulching, Drip Irrigation | |
| | | Lemon | No change | Drip Irrigation, Mulching, Spray of antitranspirants | |
| | Hill slope(High rainfall, sandy loam soil, slightly eroded acidic soil) | Orange | No change | Mulching | |
| | | Pineapple | No change | | |

| Condition | Major Farming situation | Normal Crop/cropping system | Suggested Contingency measures | | |
|---|--|--|--|---|---|
| | | | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Early season drought(delayed onset) | | | | | |
| Delay by 6 weeks July 3 rd week | Medium and Low Land (High rainfall, loamy, sandy loam soil, acidic soil) | Rice | Rice(Photo sensitive traditional var. Manohar Sali, Andrew Sali) | Close spacing, increase no. of seedlings per hill, irrigation | Collaboration with NFSM, RKVY Collaboration with NHM |
| | | Upland(High rainfall, loamy, sandy loam soil, acidic soil) | Summer vegetables | Sesame Var.1683 | |
| | Banana | No change | Mulching and fertigation | | |
| | Lemon | No change | Mulching and fertigation | | |
| | Hill slope(High rainfall, sandy loam soil, slightly eroded acidic soil) | Orange | No change | Mulching and fertigation | |
| | | Pineapple | No change | Mulching and fertigation | |

| Condition | Major Farming situation ^a | Normal Crop/cropping system ^b | Suggested Contingency measures | | |
|---|--|--|---|---|--|
| | | | Change in crop/cropping system ^c | Agronomic measures ^d | Remarks on Implementation ^e |
| Early season drought(delayed onset) | | | | | |
| Delay by 8 weeks August 1 st week | Medium and Low Land (High rainfall, loamy, sandy loam soil, acidic soil) | Rice | Photo sensitive short duration var. Luit | Broad casting of sprouted seeds, irrigation | Collaboration with NFSM, RKVY |
| | Upland(High rainfall, loamy, sandy loam soil, acidic soil) | Summer végétales | Skipped the summer vegetables and ready for early <i>rabi</i> vegetables viz. Cabbage, Radish | - | - |
| | | Banana (standing crop) | Pumpkin | Cultivation in pits with sufficient compost | - |
| | Hill slope(High rainfall, sandy loam soil, slightly eroded acidic soil) | Orange | No change | | |

| 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. | Medium and Low Land (High rainfall, loamy sandy loam soil, acidic soil) | Kharif vegetables-winter Rice Winter Rice-rapeseed Winter Rice-summer Rice | In Rice if germination is very poor re sowing needed. For kharif vegetables which are in maturity stage supplement irrigation and harvesting should be at physiological maturity stage Delayed planting of summer Rice to be harvested at physiological maturity. | Mulching, Conservation furrows | |
| | Upland(High rainfall, loamy, sandy loam soil, acidic soil) | Kharif vegetables- Rabi Vegetables Autumn rice(Direct seeded)- Vegetable | If germination of winter Rice is very poor resowing needed Standing kharif vegetable crop so apply irrigation. Harvesting of rice at physiological maturity. Life saving Irrigation in vegetables Irrigation, drip irrigation | | |
| | 3. Hill slope(High rainfall, sandy loam soil, slightly eroded acidic soil) | Fruits-Vegetables | | | |

| 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 measues | Remarks on Implementation |
| At vegetative stage | <p>1. Medium and Low Land (High rainfall, loamy sandy loam soil, acidic soil)</p> <p>2. Upland(High rainfall, loamy, sandy loam soil, acidic soil)</p> <p>3. Hill slope(High rainfall, sandy loam soil, slightly eroded acidic soil)</p> | <p>Kharif vegetables-winter Rice Winter Rice-rapeseed Winter Rice-summer Rice</p> <p>Kharif vegetables- Rabi Vegetables Autumn rice(Direct seeded)-Vegetable</p> <p>Fruits-Vegetables</p> | Harvesting of vegetables at physiological maturity, Weeding, Thinning of population. | Avoid application of remaining split dose of fertilizer, Spray of antitranspitint. | |

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

| | | | | | |
|---------------------------------|--|--|---|--|--|
| At flowering/ fruiting stage | <p>1. Medium and Low Land (High rainfall, loamy sandy loam soil, acidic soil)</p> <p>2. Upland(High rainfall, loamy, sandy loam soil, acidic soil)</p> <p>3. Hill slope(High rainfall, sandy loam soil, slightly eroded acidic soil)</p> | <p>Kharif vegetables-winter Rice Winter Rice-rapeseed Winter Rice-summer Rice Kharif vegetables- Rabi Vegetables</p> <p>Autumn rice(Direct seeded)- Vegetable</p> <p>Fruits-Vegetables</p> | Harvesting of vegetables at physiological maturity, Weeding, Thinning of population. Prepare land for rabi crop | Avoid application of remaining split dose of fertilizer, Spray of antitranspitint. | |
|---------------------------------|--|--|---|--|--|

| Condition | Major Farming situation ^a | Normal Crop/cropping system ^b | Suggested Contingency measures | | |
|--|--|--|---|--|--|
| | | | Crop management ^c | Rabi Crop planning ^d | Remarks on Implementation ^e |
| Terminal drought (Early withdrawal of monsoon) | <p>1. Medium and Low Land (High rainfall, loamy sandy loam soil, acidic soil)</p> <p>2. Upland(High rainfall, loamy, sandy loam soil, acidic soil)</p> <p>3. Hill slope(High</p> | <p>Kharif vegetables-winter Rice Winter Rice-rapeseed</p> <p>Winter Rice-summer Rice</p> <p>Kharif vegetables- Rabi vegetables Autumn rice(Direct seeded)- Vegetable</p> | Harvesting of vegetables at physiological maturity, Weeding, Thinning of population. Prepare land for rabi crop | Avoid application of remaining split dose of fertilizer, Spray of antitranspitint. | |

| | | | | | |
|--|---|-------------------|--|--|--|
| | rainfall, sandy loam soil, slightly eroded acidic soil) | Fruits-Vegetables | | | |
|--|---|-------------------|--|--|--|

2.1.2 Drought - Irrigated situation--

| Condition | Suggested Contingency measures | | | | |
|--|--------------------------------|-----------------------------|--------------------------------|-------------------|---------------------------|
| | Major Farming situation | Normal Crop/cropping system | Change in crop/cropping system | Agonomic measures | Remarks on Implementation |
| 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 | | | | |
| Winter Rice | Short term water logging may not harm to the crop. In very low land growing submergence tolerance variety may be grown | Crop may not suffers till as long as the flag leaf and panicle is out of water | Early harvesting, spaying growth regulator for enhancing early maturing of the panicle. | Provision for drying for harvested panicle |
| Rapeseed | Drainage of excess water | Drainage of excess water | Immediate harvest | Provision for drying for harvested silliqua |
| Blackgram | Provide drainage facility | Drainage of excess water | Drainage of excess water and immediate harvest | Provision for drying for harvested pods |
| Greengram | Provide drainage facility | Drainage of excess water | Drainage of excess water and immediate harvest | Provision for drying for harvested pods |
| Potato | Provide drainage facility Light hoeing after drainage | Provide drainage facility Light hoeing after drainage | Immediate harvesting | Storing the dried potato in cool dark place |
| Pea | Provide drainage facility Light hoeing after drainage | Provide drainage facility Light hoeing after drainage | Immediate harvesting | - |
| Sesame | Provide drainage facility, Light hoeing after drainage | Proper drainage facility, Light hoeing after drainage | Immediate harvesting | Drying of pods |
| Lentil | Provide drainage facility, Light hoeing after drainage | Provide drainage facility, Light hoeing after drainage | Immediate harvesting | Drying of pods |

| | | | | |
|---|--|--|--|---|
| Sugarcane | Drain out excess water | | | |
| Banana | Drain out excess water within 24 hours, immediate light hoeing after drainage of water | | | |
| Heavy rainfall with high speed winds in a short span² | Not applicable | | | |
| Horticulture | | | | |
| Outbreak of pests and diseases due to unseasonal rains | | | | |
| Rice | Proper chemical and biological plant protection measures | Proper chemical and biological plant protection measures | Proper chemical and biological plant protection measures | - |
| Black gram | | | | |
| Green gram | | | | |
| Rape seed | | | | |
| Kharif vegetable | | | | |

2.3 Floods:

| Condition | Suggested contingency measure | | | |
|--|--|--|--|--|
| | Seedling / nursery stage | Vegetative stage | Reproductive stage | At harvest |
| Transient water logging/ partial inundation¹ | | | | |
| Summer and autumn Rice | - | - | Spray of hormones to hasten ripening and immediate harvesting | Immediate harvest and provision for drying the harvest |
| Winter Rice | Drain out excess water, Submergence tolerant variety, Staggered transplanted variety(Prafulla) | Interculture operation immediately after recession of water. If damage is high go for next planting with short duration variety(Eg Luit) | Spray of hormones to enhance maturity and harvesting at physiological maturity | Immediate harvest and provision for drying the harvest |
| Blackgram | Provide drainage of the land and if damaged completely go for re sowing | Provide drainage of the land,light hoeing | Spray of hormones to enhance maturity and harvesting at physiological | Immediate harvest and provision for drying the harvest |

| | | | | |
|--|---|---|--|--|
| | | | maturity | |
| Rapeseed | Re sowing | - | - | - |
| Summer vegetables | Proper drainage of the land and if damaged completely go for resowing | Proper drainage of the land, light hoeing | Harvesting immediately | Harvest immediately |
| Continuous submergence for more than 2 days² | | | | |
| Summer and autumn Rice | - | - | Spray of hormones to hasten ripening and immediate harvesting | Immediate harvest and provision for drying the harvest |
| Winter Rice | Drain out excess water, Submergence tolerant variety, Staggered transplanted variety (Prafulla) | Interculture operation immediately after recession of water. If damage is high go for next planting with short duration variety (Eg Luit) | Spray of hormones to enhance maturity and harvesting at physiological maturity | Immediate harvest and provision for drying the harvest |
| Blackgram | Provide drainage and if damaged completely go for re sowing | Proper drainage of the land, light hoeing | Spray of hormones to enhance maturity and harvesting at physiological maturity | Immediate harvest and provision for drying the harvest |
| (Rapeseed) | Resowing | - | - | - |
| (Summer vegetables) | Proper drainage and if damaged completely go for resowing | Provide drainage, light hoeing | Harvesting immediately | Harvest immediately |
| Sea water intrusion³ | 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 ^p | Not applicable | | | |
| Cold wave ^q | Not applicable | | | |
| Frost | Not applicable | | | |

| | | | |
|------------------|--|-------------------------------------|--|
| Hailstorm | | | |
| Boro rice | Selection of lodging resistant varieties | Potash application at 25 and 45 DAT | |
| Cyclone | Not applicable | | |

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 | <ul style="list-style-type: none"> a. Storage of feed ingredient namely Maize, wheat bran, rice polish, moc etc. b. Storage of Rice straw silage making. c. Cultivation of perennial grass, fodder trees etc. | <ul style="list-style-type: none"> a. Stall feeding (restricted) b. Utilization of agricultural by-product, house hold wastage, kitchen wastage, hotel wastage(pig) | <ul style="list-style-type: none"> a. Rainfed fodder cultivation of both seasonal and perennial type b. Utilization of fodder tree leaves |
| Drinking water | <ul style="list-style-type: none"> d. Provision created for shallow tube well, Ring well. e. Community water tank | <ul style="list-style-type: none"> a. Utilization of shallow Tubewell, Ring well b. Community water tank c. Minimum use of water | Community tank |
| Health and disease management | <ul style="list-style-type: none"> a. Vaccination against viral and bacterial disease b. Anti stress management | <ul style="list-style-type: none"> a. Heat stress management as and when required. b. Showering facilities c. Wallowing (Bufaloo) d. Restricted movement. | <ul style="list-style-type: none"> a. Health tonic, Vitamin b. Management for any disease management break |

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|--------------------------------|---|---|---|
| Floods | | | |
| Feed and fodder availability | a.Storage of feed ingredient (wheat bran, Rice polish) b.Straw, processed fodder above the water level of last major flood | a.Community shelter b.Restricted stall feeding Fodder tree leaves | a.Cultivation of seasonal and perennial fodder crop b.Utilization of fodder tree leaves |
| Drinking water | a.Overhead storage water tank | Utilization of chemical treated (Chlorinated) water Boiled water | Community tank |
| Health and disease management | a.Vaccination against FMD, HS, BQ b.De-worming | a.Community rescue centre b.Quarantine/ Isolation facility c.Vaccination/ Treatment | a.Post flood disease management (Vaccination/Treatment/ Isolation) b.Quarantine/ Isolation of any suspected animal |
| Cyclone | | | |
| Feed and fodder availability | a. Storage of feed ingredient (wheat bran, Rice polish) b. Storage of fodder crop in the form of silage etc | | |
| Drinking water | a. Ground water facility creation | | |
| Health and disease management | a.Vaccination against FMD, HS, BQ b.De-worming | a.Community rescue centre b.Quarantine/ Isolation facility c.Vaccination/ Treatment | a.Post flood disease management (Vaccination/Treatment/ Isolation) b.Quarantine/ Isolation of any suspected animal |
| Heat wave and cold wave | | | |
| Shelter/environment management | Provision for community shelter | a.Community shelter facility b.Covering sheds/ animals during cold wave c.Roof reflector for sun light during heat wave.. | |
| Health and disease management | Vaccination against common disease | a.Anti stress medicated b.Restricted movement c.Stall feeding and watering | |

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| | | d.Covering animals | |
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^s based on forewarning wherever available

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 | Early storage of feed ingredients | Restricted feeding, reducing the stock | Reducing the stock and restricted feeding | |
| Drinking water | Storage water tank | Restricted use of water | Restricted use of water | |
| Health and disease management | Strategic vaccination of the bird for all possible diseases | Preventive doses of antimicrobial drug, biosecurity, electrolyte powder in day to day management | Preventive doses of antimicrobial drug, biosecurity, electrolyte powder in day to day management | |
| Floods | | | | |
| Shortage of feed ingredients | Storage of feed ingredients | Reducing the stock | Reducing the stock and restricted feeding | |
| Drinking water | Over head water reservoir | Use boiled water | Use boiled water | |
| Health and disease management | Strategic vaccination of the bird for all possible diseases | Preventive doses of antimicrobial drug, biosecurity, electrolyte powder in day to day management | Preventive doses of antimicrobial drug, biosecurity, electrolyte powder in day to day management | |
| Cyclone | | | | |
| Shortage of feed ingredients | Storage of feed ingredients | Reducing the stock | Reducing the stock and restricted | |

| | | | | |
|--------------------------------|---|---|--|--|
| | | | feeding | |
| Drinking water | Ground water facility creation | Use boiled water | Use boiled water | |
| Health and disease management | Strategic vaccination of the bird for all possible diseases, anti stress medicine | Preventive doses of antimicrobial drug, biosecurity, electrolyte powder in day to day management , anti stress medicine | Preventive doses of antimicrobial drug, biosecurity, electrolyte powder in day to day management | |
| Heat wave and cold wave | | | | |
| Shelter/environment management | Arrangement of coverage of the poultry sheds | Proper coverage of the poultry sheds | - | |
| Health and disease management | Strategic vaccination and preventive application of anti microbial drug, anti stress medicine | Preventive doses of antimicrobial drug, biosecurity, electrolyte powder in day to day management , anti stress medicine | | |

^a based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture

| | Suggested contingency measures | | |
|--|--------------------------------|------------------|-----------------|
| | Before the event | During the event | After the event |
| 1) Drought | | | |
| A. Capture | | | |
| Marine | | | |
| Inland | | | |
| (i) Shallow water depth due to insufficient rains/inflow | | | |
| (ii) Changes in water quality | | | |

| | | | |
|--|---|---|--|
| B. Aquaculture | | | |
| (i) Shallow water in ponds due to insufficient rains/inflow | <p>a. Reduce the stocking density of fishes by harvesting the marketable sized fishes</p> <p>b. At one side of the pond, depth should be made more by digging so that during drought fishes can take shelter in this deeper portion of the pond.</p> <p>c. If possible, provision should be made for pumping water into the pond from other sources or ground water.</p> <p>d. If the water body is very small, air breathing fishes like magur culture should be encouraged rather than IMC</p> <p>e. If possible provision for mechanical aerator should be made.</p> | <p>a. Application of feed and FYM should be restricted.</p> <p>b. Aeration should be done either manually or mechanically at least two times in a day (Morning and evening)</p> <p>c. Netting over pond surface can be made in these areas where attack of predatory birds is dominant.</p> <p>d. Frequent netting activities should be restricted.</p> <p>e. Lime should be applied at proper dose.</p> <p>f. $KMnO_4$ can also be applied @ 2-4 ppm.</p> | <p>a. After drought one partial harvesting should be done to check the fish health. If any symptom of disease seen, measures should be taken immediately.</p> <p>b. Lime should be applied at proper dose.</p> <p>c. Restock the pond with fingerlings if available.</p> <p>d. If the water quality and fish health is good enough then start feeding.</p> |
| (ii) Impact of salt load build up in ponds / change in water quality | <p>a. Growth of <i>Azolla pinnata</i> should be encouraged to check eutrophication and excessive evaporation.</p> <p>b. Lime should be applied according to PH of water</p> | <p>a. Don't make any disturbances in the pond from outside like netting, application of feed, FYM etc.</p> <p>b. Activities like bathing, washing domestic animals should be stopped.</p> | <p>a. After drought check water quality and fish health.</p> <p>b. When fish health and water quality becomes normal start feeding and fertilizing activities.</p> |
| 2) Floods | | | |
| A. Capture | | | |
| Marine | | | |
| Inland | | | |
| (i) Average compensation paid due to loss of human life | | | |
| (ii) No. of boats / nets/damaged | | | |
| (iii) No. of houses damaged | | | |
| (iv) Loss of stock | | | |
| (v) Changes in water quality | | | |

| | | | |
|---|---|--|--|
| (vi) Health and diseases | | | |
| B. Aquaculture | | | |
| (i) Inundation with flood water | <p>a. Broken dykes of pond should be repaired.</p> <p>b. Height of the pond dyke should be increased above the flood level.</p> <p>c. Bamboo screen or nylonnets should be made ready for sudden rise in flood level.</p> <p>d. Inlets and outlets of the ponds should be checked for working condition.</p> <p>e. Marketable sized fishes should be harvested.</p> | <p>a. Bamboo screen or nylonnets should be placed round the pond dyke.</p> <p>b. Stop application of feed, fertilizer and lime.</p> <p>c. If flood level starts decreasing apply KMnO₄ @ 2-4 ppm.</p> | <p>a. Lime should be applied at proper dose.</p> <p>b. Repeated netting should be done to check fish health and entry of any unwanted and predatory fishes.</p> <p>c. Apply KMnO₄ @ 2-4 ppm</p> |
| (ii) Water contamination and changes in water quality | <p>a. Reduce the stocking density of fishes by harvesting the marketable sized fishes</p> <p>b. Stop application of feed, fertilizer and manure.</p> <p>c. Lime should be applied at proper dose.</p> | <p>a. Stop feeding</p> <p>b. Stop application of manure.</p> | <p>a. Examine water quality and then go for liming, manuring and feeding.</p> |
| (iii) Health and diseases | <p>a. Lime should be applied at proper dose.</p> <p>b. Apply KMnO₄ @ 2-4 ppm frequently.</p> | <p>a. Stop feeding, manuring and netting activities.</p> | <p>a. Check fish health by netting</p> <p>b. Lime should be applied at proper dose.</p> <p>c. Apply CIFAX.</p> |
| (iv) Loss of stock and inputs (feed, chemicals etc) | | | |
| (v) Infrastructure damage (pumps, aerators, huts etc) | | | |
| 3. Cyclone / Tsunami | Not applicable | | |
| 4. Heat wave and cold wave | Not applicable | | |