

State: BIHAR

Agriculture Contingency Plan for District: Arwal

| 1.0 District Agriculture profile | | | | |
|---|--|---|--|----------|
| 1.1 | Agro-Climatic/Ecological Zone | | | |
| | Agro Ecological Sub Region (ICAR) | Northern Plain, Hot Sub humib (Dry) Eco- sub region (9.2) | | |
| | Agro-Climatic Zone (Planning Commission) | Middle Gangetic Plain Region (IV) | | |
| | Agro Climatic Zone (NARP) | South Bihar Alluvial Plain Zone (BI-3) | | |
| | List all the districts falling under the NARP Zone* (*>50% area falling in the zone) | Aurangabad, Gaya, Jahanabad, Patna, Arwal, Rohtas, Nalanda, Bhojpur, Buxar, Bhabhua, Nawada (Earlier this district was carved out from Jehanabad) | | |
| | Geographic coordinates of district headquarters | Latitude | Longitude | Altitude |
| | | 25 ⁰ - 25 ⁰ 15' N | 84 ⁰ - 85 ⁰ 15'E | 67.9 m |
| | Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS | ARI, Lohia Nagar, Patna | | |
| | Mention the KVK located in the district with address | Krishi Vigyan Kendra, Arwal, Lodipur farm, Po- Sarvarpur Dist- Arwal, Pin- 804428 | | |
| | Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone | BAC, Sabour , Bhagalpur | | |

| 1.2 | Rainfall | Normal RF(mm) | Normal Onset | Normal Cessation |
|------------|-----------------------|----------------------|------------------------------|---------------------------------|
| | SW monsoon (June-Sep) | 972.25 | 3 rd week of June | 2 nd week of October |
| | NE Monsoon(Oct-Dec) | 28.8 | | |
| | Winter (Jan- Feb) | 30.8 | | |
| | Summer (March- May) | 42.2 | | |
| | Annual | 1013.8 | | |

| | | | | | | | | | | | |
|------------|---|-------------------|-----------------|-------------|---------------------------------|--------------------|----------------------|--|------------------------------|-----------------|---------------|
| 1.3 | Land use pattern of the district (latest statistics) | Geographical area | Cultivable area | Forest area | Land under non-agricultural use | Permanent pastures | Cultivable wasteland | Land under Misc. tree crops and groves | Barren and uncultivable land | Current fallows | Other fallows |
| | Area ('000, ha) | 63.4 | 43.1 | | 8.5 | 0.5 | 1.0 | 0.017 | 0.08 | 6.5 | 1.3 |

| 1.4 | Major Soils | Area ('000 ha) | Percent (%) of total |
|------------|--------------------------|-----------------------|-----------------------------|
| | Sandy Soils | 2.00 | 3.14 |
| | Coarse Sandy Loam Soils | 9.50 | 14.91 |
| | Fine Sandy Loam Soils | 12.60 | 19.78 |
| | Clayey Soils | 35.364 | 55.52 |
| | Saline/ Calcareous Soils | 4.236 | 6.65 |

*Arwal was carved out from Jehnabad district

| 1.5 | Agricultural land use | Area ('000 ha) | Cropping intensity % |
|------------|------------------------------|-----------------------|-----------------------------|
| | Net sown area | 43.1 | 197% |
| | Area sown more than once | 13.3 | |
| | Gross cropped area | 85.0 | |

| 1.6 | Irrigation | Area ('000 ha) | | |
|------------|------------------------------|-----------------------|-----------------------|---|
| | Net irrigated area | 26.5 | | |
| | Gross irrigated area | 45.1 | | |
| | Rainfed area | 17.1 | | |
| | Sources of Irrigation | Number | Area ('000 ha) | Percentage of total irrigated area |
| | Canals | - | 7.2 | 16% |

| | | | | |
|---|--|------------------------|----------|---|
| | Tanks | - | - | - |
| | Open wells | - | - | - |
| | Bore wells- Deep TW | - | 17.1 | 38% |
| | Lift irrigation schemes (Surface lift) | - | - | - |
| | Micro-irrigation | - | - | - |
| | Other sources (please specify) Dug well & shallow well | - | 20.7 | 46% |
| | Total Irrigated Area | | 45.137 | |
| | 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 (as per latest figures of 2008-09)

| 1.7 | Major field crops cultivated | Area ('000 ha) | | | | | | | |
|-----|------------------------------|----------------|---------|-------|-------------|---------|-------|--------|-------------|
| | | <i>Kharif</i> | | | <i>Rabi</i> | | | Summer | Grand total |
| | | Irrigated | Rainfed | Total | Irrigated | Rainfed | Total | | |
| | Rice | | | 44.1 | | | | | 44.1 |
| | Wheat | | | - | | | 15.0 | | 15.0 |
| | Maize | | | 0.4 | | | | | 0.4 |
| | Chickpea | | | - | | | 4.9 | | 4.9 |
| | Lentil | | | - | | | 6.2 | | 6.2 |
| | Pigeonpea | | | 1.0 | | | | | 1.0 |

| | | | | | | | | | |
|--|--|-----------------------|------------------|-----|----------------|--|-----|--|-----|
| | Blackgram | | | 0.6 | | | | | 0.6 |
| | Pea | | | - | | | 1.1 | | 1.1 |
| | Rapeseed and Mustard | | | - | | | 2.3 | | 2.3 |
| | Linseed | | | - | | | 2.0 | | 2.0 |
| | Horticulture crops - Fruits | Area (*000 ha) | | | | | | | |
| | | Total | Irrigated | | Rainfed | | | | |
| | Mango | 0.226 | | | | | | | |
| | Guava | 0.206 | | | | | | | |
| | Banana | 0.009 | | | | | | | |
| | Citrus | 0.105 | | | | | | | |
| | Aonla | 0.002 | | | | | | | |
| | Papaya | 0.035 | | | | | | | |
| | Ber | 0.002 | | | | | | | |
| | Horticulture crops – Vegetables | Total | Irrigated | | Rainfed | | | | |
| | Potato | 3.5 | | | | | | | |
| | Cauliflower | 0.3 | | | | | | | |
| | Tomato | 0.4 | | | | | | | |
| | Brinjal | 0.3 | | | | | | | |
| | Onion | 0.3 | | | | | | | |
| | Cabbage | 0.3 | | | | | | | |
| | Okra | 0.4 | | | | | | | |
| | Pea | 0.04 | | | | | | | |
| | Radish | 0.07 | | | | | | | |
| | Carrot | 0.03 | | | | | | | |
| | Parwal | 0.078 | | | | | | | |
| | Medicinal and Aromatic crops | Total | Irrigated | | Rainfed | | | | |
| | Lemon grass, Tulsi, Mentha and other | 0.034 | | | | | | | |
| | Plantation crops | | | | | | | | |
| | Fodder crops | | | | | | | | |
| | Total fodder crop area | | | | | | | | |

| | | | | |
|--|------------------------|--|--|--|
| | Grazing land | | | |
| | Sericulture etc | | | |

| | | | | | | | |
|-------------|---|-------------------------------|---------------------|------------------------------------|------------------------------------|--|---|
| 1.8 | Livestock | | Male | Female | Total ('000 ha) | | |
| | Non descriptive Cattle (local low yielding) | | 15 | 12 | 27 | | |
| | Improved cattle | | | | | | |
| | Crossbred cattle | | 1.37 | 7.2 | 8.6 | | |
| | Non descriptive Buffaloes (local low yielding) | | 5 | 23 | 28 | | |
| | Descript Buffaloes | | | | | | |
| | Goat | | | | 48.6 | | |
| | Sheep | | | | 2.5 | | |
| | Others (Camel, Pig, Yak etc.) Pig | | | | 6.9 | | |
| | Commercial dairy farms (Number) | | | | | | |
| 1.9 | Poultry | | No. of farms | Total No. of birds('000 ha) | | | |
| | Commercial | | | 46.0 | | | |
| | Backyard | | | 47.1 | | | |
| 1.10 | Fisheries (Data source: Chief Planning Officer) | | | | | | |
| | A. Capture | | | | | | |
| | i) Marine (Data Source: Fisheries Department) | No. of fishermen | Boats | | Nets | | Storage facilities (Ice plants etc.) |
| | | | Mechanized | Non-mechanized | Mechanized (Trawl nets, Gill nets) | Non-mechanized (Shore Seines, Stake & trap nets) | |
| | ii) Inland (Data Source: Fisheries Department) | No. Farmer owned ponds | | No. of Reservoirs | | No. of village tanks | |
| | | 435 | | | | 234 | |
| | 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) | | | 634 | | | |

Source: SREP, ATMA, NABARD(PLCP,ARWAL2010-11),DAO, Jehanabad, DSO,ARWAL

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 | 159.1 | 3540 | | | - | - | - | - | - |
| | Wheat | - | | 36.1 | 2431 | - | - | - | - | - |
| | Maize | 1.6 | 3714 | | | - | - | - | - | - |
| | Chickpea | - | - | 7.9 | 1600 | - | - | - | - | - |
| | Lentil | - | - | 9.8 | 1600 | - | - | - | - | - |
| | Rapeseed & Mustard | - | - | 3.7 | 1600 | - | - | - | - | - |
| | Pigeonpea | 1.870 | 1750 | | | - | - | - | - | - |
| Major Horticultural crops (Crops identified based on total acreage) | | | | | | | | | | |
| | Mango | - | - | - | - | - | - | 2.4 | 105.9 | |
| | Banana | - | - | - | - | - | - | 0.1 | 150.0 | |
| | Guava | - | - | - | - | - | - | 2.5 | 120 | |
| | Citrus | - | - | - | - | - | - | 0.6 | 61 | |
| | Papaya | - | - | - | - | - | - | 1.2 | 350 | |

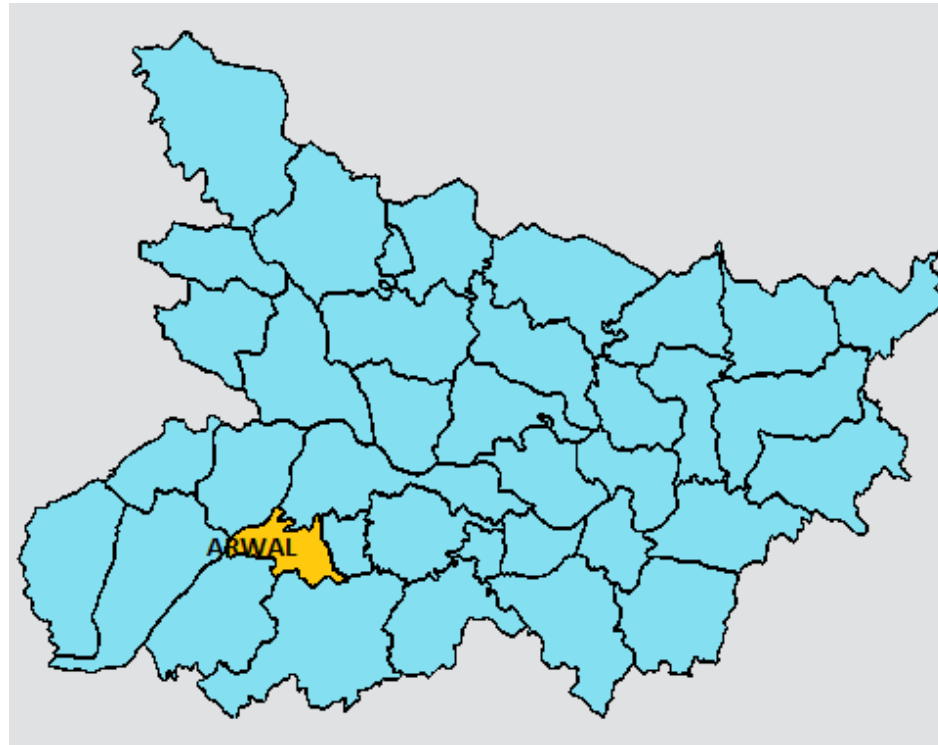
| 1.12 | Sowing window for 5 major crops (start and end of sowing period) | Rice | Maize | Wheat | Potato | Mustard | Lentil |
|------|--|---|--|-------|--------|---------|--------|
| | Kharif rainfed | 4 th week of June - 2 nd week of July | - | - | - | - | - |
| | Kharif irrigated | 4 th week of May- 4 th week of June | 3 rd week of May - 4 th week of June | - | - | - | - |

| | | | | | | | |
|--|----------------|---|---|--|--|---|--|
| | Rabi rainfed | - | - | - | - | - | 3 rd week of October – 3 rd week of November |
| | Rabi irrigated | - | - | 2 nd week of November - 4 th week of November (timely sowing) 2 nd week of December - 4 th week of December (late sowing) | 3 rd week of October - 3 rd week of November | 2 nd week of October – 4 th week of October (timely sowing); 1 st week of December - 4 th week of December (late sowing) | 4 th week of Oct. – 2 nd week of Nov. |

| 1.13 | What is the major contingency the district is prone to? (Tick mark) | Regular | Occasional | None |
|------|---|---------|------------|------|
| | Drought | √ | | |
| | Flood | | | √ |
| | Cyclone | | | √ |
| | Hail storm | | | √ |
| | Heat wave | | √ | |
| | Cold wave | | √ | |
| | Frost | | | √ |
| | Sea water intrusion | | | √ |
| | Pests and 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 2 | Enclosed: Yes |
| | | Soil map as Annexure 3 | Enclosed: Yes (This district came into existence in September 2001 and was earlier part of Jehanabad district) |

Annexure-I



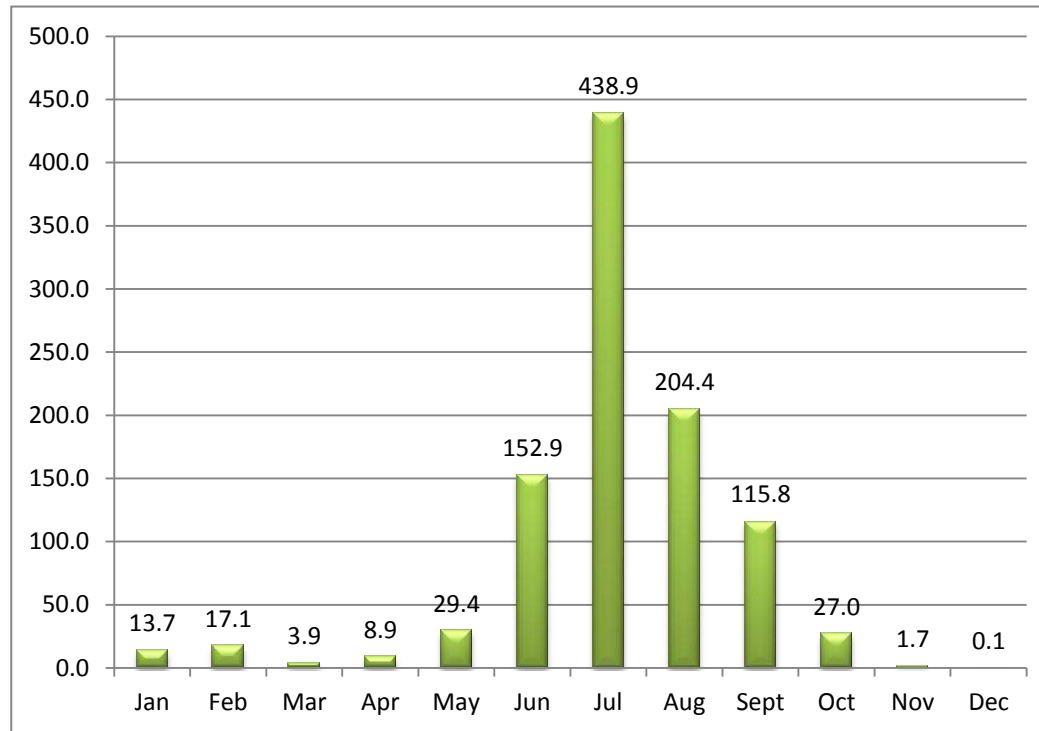
*Arwal was carved out from Jehnabad district

Agro climatic Zones of Bihar

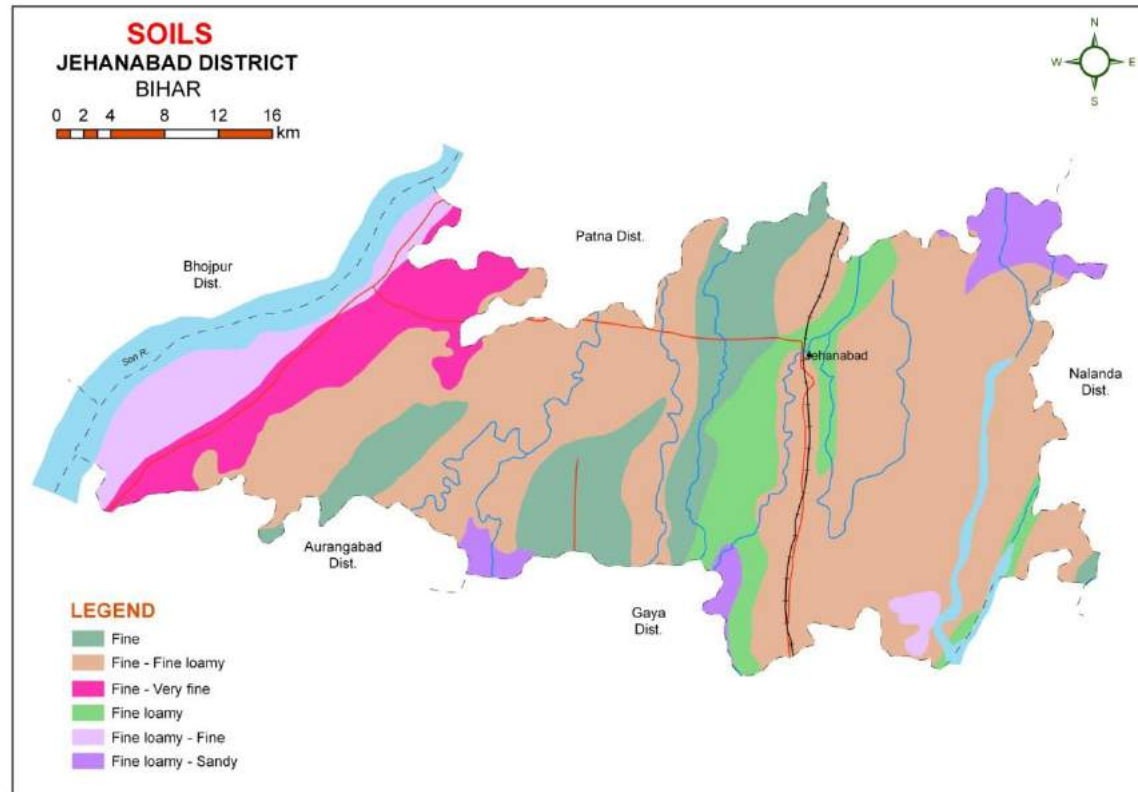


Source: krishi.bih.nic.in

Annexure-II



Annexure-III



*Arwal was carved out from Jehnabad district, so left part of image shows the soil profile of arwal district

Source : NBSS& LUP, Regional Centre, Kolkata

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 1 st week of July | Upland Very deep fine clay soils | 1.Pigeonpea/ Maize/Blackgram 2. Vegetables- Wheat 3. Rice-Wheat 4. Rice- Lentil/Pea/ Chickpea 5. Rice – Mustard /Potato | No change | - | - |
| | | | Pigeonpea / Maize/Blackgram Rice- Chickpea Rice – Lentil/Pea/ Chickpea Rice – Mustard Pigeonpea –Bahar, Narendra arhar-I Blackgram- T-9, Pant 30 Maize – Deoki . Ganga -2 | | |
| | Early Rice-Wheat Rice- Prefer Long to medium duration varieties | <ul style="list-style-type: none"> • Adopt normal package of practices • | | | |
| | Medium land | 1.Rice-Wheat 2.Rice-Lentil/Pea/ Chickpea 3.Rice – Mustard | No change Rice- ajendra sweta (135-140d), Rajendra mahsuri (140-150 days), Sita (130-140d), Rajendra Bhagawati, Rajendra Suwasni, BPT 5204 , R. Kasturi, | | |
| | Lowland | 1. Rice-Wheat 2. Rice- Lentil 3. Rice - Chickpea | No change Rice- Rajshree, Santosh , Sita, Rajendra Mansuri-1, R-Sweta, BPT5204 | | |

| 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 3 rd week of July | Upland Very deep fine clay soils | 1. Pigeonpea / Maize/ Blackgram 2. Vegetables- Wheat 3. Rice-Wheat 4. Rice- Lentil/Pea/ Chickpea 5. Rice – Mustard /Potato | Short duration Rice- Wheat Short duration Rice- Lentil Short duration Rice- Chickpea Rice- Prefer Medium to short duration varieties like Saroj (100-110d), Birsa Dhan-201 (100-115d) Rajendra Bhagwati, Pigeonpea – Bahar, Narendra arhar-I Blackgram- T-9, Pant 30 Maize – Deoki . Ganga -2 | <ul style="list-style-type: none"> Direct seeding of rice with medium duration drought tolerant varieties with pre emergence herbicide application under sufficient soil moisture conditions followed up with a post-emergence weedicide application 20-25 days later for effective weed management. Interculture for timely weed control in direct seeded rice | Seeds from BRBN, BAU, Sabour, NSC, TDC |
| | Medium land | 1.Rice-Wheat 2.Rice-Lentil/Pea/ Chickpea 3.Rice – Mustard | Medium duration Rice –Wheat/ Lentil/ Chickpea Direct sowing / 20d old dapog seedlings with medium to short duration varieties – BR34, Rajendra Dhan-201(130-135d), Saroj, Rajendra Suwasni, Santosh, R. Kasturi, Sita | <ul style="list-style-type: none"> Where field is moist, direct seeding of medium duration varieties (125 days) can be done during second fortnight of July in midlands. Post-emergence herbicide application use is essential Use mat nursery/ dapog nursery , mat nursery (dapog method) can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August in mid and low lands | |
| | Lowland | 1. Rice-Wheat 2. Rice- Lentil 3. Rice - Chickpea | Long duration Rice –Wheat Lentil/ Chickpea Rice- Direct/ dapog seedlings with Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta, Swarna sub-1 | <ul style="list-style-type: none"> Raise staggered community nursery preferably with short duration varieties in mid and lowlands | |

| | | | | | |
|--|--|--|--|--|--|
| | | | | <ul style="list-style-type: none"> • Transplant with 30-35 days old seedling may be used with 3-4 seedling per hill with close spacing. • Timely interculture for weed control in direct seeded rice | |
|--|--|--|--|--|--|

| Condition | | Suggested Contingency measures | | | |
|--|-------------------------------------|--|--|--|--|
| Early season drought (delayed onset) | Major Farming situation | Normal Crop/cropping system | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Delay by 6 weeks 1 st week of August | Upland Very deep fine clay soils | Rice –Wheat Rice-Lentil Pigeonpea / Maize/ Blackgram | Pigeonpea/ Vegetables –Wheat/Lentil/ Chickpea (short duration) Blackgram/ Finger millet-Wheat Blackgram-Pant U-31 , Pant U-19 Finger millet- RAU-7&8 | <ul style="list-style-type: none"> • Life saving irrigation | Seeds from BRBN, BAU, Sabour, NSC, TDC |
| | Rainfall (1200-1400 mm) | Rice- Chickpea | Early Rice - Wheat Blackgram/ Finger millet-Wheat Blackgram- -Pant U-31,-Pant U19.Finger millet- RAU-7&8. Rice- Prefer short (early matured) varieties like Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi, Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d), Prabhat, Turanta, | <ul style="list-style-type: none"> • Direct seeding of Rice • Application of fertilizers especially phosphorous and potash to be ensured under late sown/ transplanted conditions in severely affected districts | |
| | Medium land | Rice –Wheat Rice- Lentil Rice- Chickpea | Rice (Short duration)--Wheat/Lentil/ Chickpea Rice- Prabhat, Dhanlaxmi, Richharia, Turanta Saroj | <ul style="list-style-type: none"> • Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first | |

| | | | | | |
|--|---------|--|---|---|--|
| | | | Blackgram/ Finger millet-Wheat Blackgram- Pant U-31& 19 Finger millet- RAU-7&8 | fortnight of August <ul style="list-style-type: none"> • Direct seedling of Rice • Raise staggered community nursery preferably with medium duration varieties in mid and lowlands | |
| | Lowland | Rice –Wheat Rice-Lentil Rice- Chickpea | Early Rice–Wheat/Pulses/ Oilseeds/Vegetables Rice (Short Duration)-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj If dry spell continues, direct seeding of early duration rice varieties (100 days) can be done in midlands by first fortnight of August and extra early duration (70-75 days) up to 25 th August | | |

| 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 8 weeks 3 rd week of August | Upland Very deep fine clay soils | Rice-Wheat Rice-Lentil Rice- Chickpea | Pigeonpea + Til/Blackgram Maize- Wheat Maize - Lentil/ Chickpea Blackgram/ /Finger millet -Wheat Sesame-Wheat Sept.Pigeonpea–Pusa-9, Sharad Narendra Arhar-I | <ul style="list-style-type: none"> • Direct seeding of Rice • Application of fertilizers especially phosphorous and potash to be ensured under late sown/ transplanted conditions in severely affected districts | Seeds from BRBN, BAU, Sabour, NSC, TDC |

| | | | | |
|--|-------------|--|--|---|
| | | | <p>Sesame : Krishna, Pragati</p> <p>Rice- Prefer Early matured varieties like Turanta dhan (75d), Prabhat (90d), Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi, Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d)</p> | |
| | Medium Land | <p>Rice-Wheat</p> <p>Rice-Lentil</p> <p>Rice- Chickpea</p> | <p>Sept. Pigeonpea / Rice- Wheat/Lentil/ Chickpea/Lathyrus</p> <p>Sept.Pigeonpea–Pusa-9, Sharad Narendra Arhar-I</p> <p>Direct seeded rice (DSR) with short duration (80-90 days) varieties (Turanta dhan, Prabhat, Anjali, Vandana, CR-Dhan-40 etc.)</p> <p>Rice-Prabhat, Dhanlaxmi, Richharia, Turanta</p> | <ul style="list-style-type: none"> • Direct seeding of rice • Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August • Use of 20 days old dapog seedling in rice. • Fodder varieties of Jowar, Maize, Bajra in combination with legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts |
| | Lowland | <p>Rice-Wheat</p> <p>Rice-Lentil</p> <p>Rice- Chickpea</p> | <p>Rice long duration (Direct seeded)-Wheat</p> <p>Rice- Rice long duration</p> | <ul style="list-style-type: none"> • Re-transplanting of rice (karuhan) can be done with 30 + 45 days old seedlings of long duration or photosensitive varieties up to 30th August with close planting (40-45 hills per square meter) • Application of organic manure and vermi compost initially for Rice and other crops. |

| | | | | | |
|--|--|--|--|--|--|
| | | | | <ul style="list-style-type: none"> Fodder varieties of Jowar, Maize, Bajra in combination with legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts | |
|--|--|--|--|--|--|

| 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. | Upland | 1.Pigeonpea 2.Vegetables -Wheat 3.Rice – Wheat/ Lentil / Chickpea/Mustard | <ul style="list-style-type: none"> Gap filling if needed Thinning | <ul style="list-style-type: none"> Mulching Tillage conservation Inter cultivation Mechanical weeding Life saving irrigation | Seeds from BRBN, BAU, Sabour, NSC, TDC |
| | Very deep fine clay soils | | | | |
| | Medium land | Rice – Wheat/ Lentil / Chickpea/ Mustard | | | |
| | Lowland | Rice – Wheat/ Lentil / Chickpea/ Mustard | | | |

| 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 | Upland | Rice – Wheat/ Lentil / Chickpea | <ul style="list-style-type: none"> • Gap filling of existing crop • Postponement of top dressing | <ul style="list-style-type: none"> • Inter culturing • Mulching • Conservation tillage • Foliar spray with (1%) MOP • Life saving irrigation | |
| | Very deep fine clay soils | Rice- Prabhat, Richharia , Dhanlaxmi, Turanta Saroj | | | |
| | Medium land | Rice – Wheat/ Lentil / Chickpea | | | |
| | Lowland | Rice – Wheat/ Lentil/Chickpea Rice- Rajshree, Santosh , Sita, Rajendra Suwasni | | | |

| Condition | | | Suggested Contingency measures | | |
|-------------------------------------|-------------------------|---|---|--|--|
| Mid season drought (long dry spell) | Major Farming situation | Normal Crop/cropping system | Crop management | Soil nutrient & moisture conservation measures | Remarks on Implementation |
| At flowering/ fruiting stage | Upland | Rice – Wheat/ Lentil / Chickpea | <ul style="list-style-type: none"> • Postponement of top dressing of nutrients • Life saving irrigation | <ul style="list-style-type: none"> • Interculture • Foliar application with 2% MOP • Mulching • Conservation tillage • Life saving irrigation | Seeds from BRBN, BAU, Sabour, NSC, TDC |
| | Medium land | Rice – Wheat/ Lentil / Chickpea | | | |
| | Lowland | Rice – Wheat/ Lentil / Chickpea Rice- Rajshree, Santosh , Sita, Rajendra Suwasni | | | |

| Condition | | | Suggested Contingency measures | | |
|-----------|--|--|--------------------------------|--|--|
|-----------|--|--|--------------------------------|--|--|

| Terminal drought (Early withdrawal of monsoon) | Major Farming situation | Normal Crop/cropping system | Crop management | Rabi crop planning | Remarks on Implementation |
|---|-------------------------|--|---|---|--|
| | Upland | Rice-Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj | <ul style="list-style-type: none"> • Foliar application with 2% Urea to boost up the vegetative growth • Mulching • Life saving irrigation | <ul style="list-style-type: none"> • For rabi land preparation open the furrow during evening, leave it open overnight and plank next morning before sunrise for growing early rabi crops like Wheat, Rabi Maize/Pulses /Oilseeds/ Vegetables etc. • Stored water to be used at critical stage of growth of LSI • Clean irrigation channel for preventing loss of moisture through seepage • Zero tillage sowing of wheat | Seeds from BRBN, BAU, Sabour, NSC, TDC |
| | Medium land | Maize-Wheat | | | |
| | | Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki, Pusa early hybrid Maka-3 Pigeonpea Var. Bahar, Narendra Pigeonpea-1 | | | |
| | Lowland | Rice-Wheat-Greengram Rice- Rajshree, Santosh , Sita, Rajendra Suwasni | | | |

2.1.2 Drought - Irrigated situation

| Condition | Major Farming situation | Normal Crop/cropping system | Suggested Contingency measures | | |
|--|-------------------------------|--|---|---|--|
| | | | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Delayed release of water in canals due to low rainfall | Upland, Medium land, Low land | Rice-Wheat/ Lentil/Chickpea/ Oilseeds | Short duration Rice –Late Wheat Early Vegetables -Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta | <ul style="list-style-type: none"> • Direct seeding of rice • Use dapog nursery seedlings for transplanting in mid and lowlands • Life saving irrigation | Seeds from BRBN, BAU, Sabour, NSC, TDC |

| Condition | Major Farming situation | Normal Crop/cropping system | Suggested Contingency measures | | |
|--|-------------------------|--------------------------------------|---|---|--|
| | | | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Limited release of water in canals due to low rainfall | Upland & Medium land | Rice-Wheat/Lentil/Chickpea/ Oilseeds | Short duration Rice –Late Wheat Early Vegetables -Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I Gram- Pusa-256, KPG-39 (Uday) , Pusa-372, SG-2 Lentil- PL-406, Malika, Arun ,PL 639 | <ul style="list-style-type: none"> • Direct seeding of rice • Use dapog nursery seedlings • Adopt SRI technology • Spray of 20 kg/ha of nitrogenous fertilizer over & above basal dose when moisture is available (limited water) • Moisture conservation through mulching | Seeds from BRBN, BAU, Sabour, NSC, TDC |
| | Lowland | Rice-Wheat | Rice-Wheat/ Lentil/Chickpea/ Oilseeds Rice-, Santosh , Sita, Rajendra Suwasni, R.kasturi | | |

| Condition | Major Farming situation | Normal Crop/cropping system | Suggested Contingency measures | | |
|--|-------------------------|---|--|---|--|
| | | | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Non release of water in canals under delayed onset of monsoon in catchment | Upland & Medium land | Rice-Wheat/ Lentil/Chickpea/ Oilseeds Rice- Prabhat, Dhanlaxmi, Richharia, Rajendra Bhagwati, Saroj | 1.Pigeonpea 2.Blackgram-Lentil / Chickpea/ Oilseeds 3.Sesame - Lentil / Chickpea/ Oilseeds | <ul style="list-style-type: none"> • Mulching for moisture conservation • Application of FYM/compost/vermicompost • Foliar application of 2% MOP to resist in dry spell condition in standing crop | Seeds from BRBN, BAU, Sabour, NSC, TDC |

| Condition | Major Farming situation | Normal Crop/cropping system | Suggested Contingency measures | | |
|-----------|-------------------------|-----------------------------|--------------------------------|--|---------------------------|
| | | | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| | | | | <ul style="list-style-type: none"> Mechanical weeding | |

| Condition | Major Farming situation | Normal Crop/cropping system | Suggested Contingency measures | | |
|--|-------------------------|---|--------------------------------|---|--|
| | | | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Lack of inflows into tanks due to insufficient /delayed onset of monsoon | Upland & Medium land | Rice-Wheat/ Lentil/Chickpea/ Oilseeds/ Potato | Prefer sesame | <ul style="list-style-type: none"> Mulching for moisture conservation Application of FYM/compost/vermicompost Foliar application of 2% MOP to resist in dry spell condition in standing crop Mechanical weeding | Seeds from BRBN, BAU, Sabour, NSC, TDC |

| Condition | Major Farming situation | Normal Crop/cropping system | Suggested Contingency measures | | |
|---|-------------------------|-----------------------------|---|---|--|
| | | | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Insufficient groundwater recharge due to low rainfall | Upland & Medium land | Rice – Wheat | 1. Short duration Rice– Late Wheat 2.Pigeonpea Rice-Prabhat,dhanlaxmi, Richharia, Turanta | <ul style="list-style-type: none"> Mulching for moisture conservation Application of FYM/compost/vermicompost Foliar application of 2% MOP to resist in dry spell condition in standing crop Mechanical weeding | Seeds from BRBN, BAU, Sabour, NSC, TDC |

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 | | | | |
| Rice | <ul style="list-style-type: none"> • Drainage management • Re transplanting through Dapog nursery if needed • Gap filling, if required • Resowing through drum seeder | <ul style="list-style-type: none"> • Drainage management • Subsequent crop like Toria may be taken if present crop is substantially damaged/affected | <ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged • Harvest at physiological maturity | <ul style="list-style-type: none"> • Proper drying • Transportation |
| Maize | <ul style="list-style-type: none"> • Drainage management • Gap filling, if needed • Resowing, if sequentially affected | <ul style="list-style-type: none"> • Drainage management • Alternative Rabi maize or other rabi crop if substantially damaged | <ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged • Harvest at physiological maturity | <ul style="list-style-type: none"> • Proper drying • Safer storage and Transportation |
| Pigeonpea | <ul style="list-style-type: none"> • Drainage management • Gap filling if needed • September sowing of Pigeonpea if Kharif Pigeonpea is completely affected | <ul style="list-style-type: none"> • Drainage management | - | <ul style="list-style-type: none"> • Proper drying • Safer storage and Transportation |
| Horticulture | | | | |
| Mango Banana Guava | <ul style="list-style-type: none"> • Drainage management • Gap filling • Replanting if completely damaged | <ul style="list-style-type: none"> • Drainage management | <ul style="list-style-type: none"> • Drenching with copper fungicides • Drainage management | Storage and transportation at safer place |
| Lemon | <ul style="list-style-type: none"> • Drainage management • Re-plantation | Drainage management | Drainage management | Storage at safer place |
| Coconut | <ul style="list-style-type: none"> • Drainage management • Re-plantation | Drainage management | Drainage management | Storage at safer place |
| Heavy rainfall with high speed winds in a short span | | | | |
| Rice | <ul style="list-style-type: none"> • Gap filling, if required | | | <ul style="list-style-type: none"> • Safer storage |
| Maize | <ul style="list-style-type: none"> • Gap filling, if damage less than 20% | | | <ul style="list-style-type: none"> • Safer storage |

| | | | | |
|---|--|--|--|---|
| | <ul style="list-style-type: none"> • If more, damage replanting | | | |
| Pigeonpea | <ul style="list-style-type: none"> • Gap filling if required | | | <ul style="list-style-type: none"> • Safer storage |
| Horticulture | | | | |
| Mango | <ul style="list-style-type: none"> • Drainage management • Replanting, if completely damaged | - | - | Safe storage and transportation |
| Litchi | | - | - | Safe storage and transportation |
| Banana | | Staking with Bamboo | Staking with Bamboo | |
| Papaya | | - | - | |
| Outbreak of pests and diseases due to unseasonal rains | | | | |
| Rice | <ul style="list-style-type: none"> ❖ Seedling treatment with granular insecticide with phorate 10G or carbofuran 3G. ❖ Maintain shallow water in nursery beds ❖ Providing good drainage. | <ul style="list-style-type: none"> ❖ Use copper fungicides against Bacterial leaf blight (BLB). ❖ Split application of N fertilizer (3-4 times) | <ul style="list-style-type: none"> ❖ Harvest at physiological maturity | Proper drying and safe storage |
| Maize | <ul style="list-style-type: none"> ❖ Drainage, and yellowing mainly due to nitrogen deficiency apply N split doses ❖ Application of granular insecticides viz. Thimet 10g, or Carbofuran 3g. in whorl of maize | <ul style="list-style-type: none"> ❖ Foliar blight control through Mancozeb @ 2.5g/l Or Zineb/ Maneb @ 2.5-4 g/lit of water (2-4 applications at 8-10 days interval) | <ul style="list-style-type: none"> ❖ Cob harvesting from standing crop ❖ Harvest at physiological maturity | <ul style="list-style-type: none"> ❖ Storage in safe places like farmer warehouse/tent covering of produce ❖ Ensure 10-12% moisture in grains before storage ❖ Proper drying |
| Pigeonpea | <ul style="list-style-type: none"> ❖ Provide drainage ❖ Seed treatment with 1 g carbendizim +2g thiram/kg seed. | Provide drainage | Provide drainage | <ul style="list-style-type: none"> ❖ Proper drying • Storage at safe place and transportation |
| Horticulture | | | | |
| Vegetables | <ul style="list-style-type: none"> • Drainage of standing water • Spraying of pesticides with adjuvant. | | | Safe storage & transportation |

| | | | | |
|--------|--|---|---|-------------------------------|
| Mango | Mango | <p>Anthracnose:- The foliar infection can be controlled by spraying of copper oxychloride (0.3%)</p> <p>Use bio control agent viz <i>Streptosporangium pseudovulgare</i></p> <p>Bacterial canker: Regular inspection of orchards, sanitation and seedling certification are recommended as preventive measures.</p> <p>Mango stones for raising seedlings (root stock) should always be taken from healthy fruits.</p> <p>Use of wind-breaks helps in reducing brushing/ wounding and thus reduces the chance of infection.</p> | <p>Anthracnose:- Apply Carbendazim/ Thiophanate methyl (1g/lit) to control of Anthracnose. Blossom infection can be controlled effectively by spraying of Bavistin (0.1%) at 15 days interval.</p> <p>Mango powdery mildew: Spray wettable sulphur(0.2%) & calixin or karathane (0.1%) during second week of December</p> | |
| Litchi | <p>Fruit Fly: Monitor adult fruit flies emergence by using methyl eugenol or sex pheromone traps.</p> | <p>Fruit Fly: First Spray delta menthrin 0.0025% plus molasses 0.1% . after 10-12 days spray fenthion 0.05% + molasses 0.1% followed by dimethoate 0.045% + molasses 0.1% if required</p> | Harvest at proper time | |
| Banana | <ul style="list-style-type: none"> • Drainage of standing water | | | Safe storage & transportation |
| Papaya | <ul style="list-style-type: none"> • Drainage of standing water | | | Safe storage & transportation |

2.3 Floods

| Condition | Suggested contingency measure ^o | | | |
|--|--|------------------|--------------------|------------|
| | Seedling / nursery stage | Vegetative stage | Reproductive stage | At harvest |
| Transient water logging/ partial inundation ¹ | | | | |
| Continuous submergence for more than 2 days ² | Not Applicable | | | |
| Sea water intrusion ³ | | | | |

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 | | | | |
| Rice Maize Pigeonpea | Provide irrigation | Provide irrigation, | Provide irrigation, | |
| Horticulture | | | | |
| Mango, Papaya Litchi | Provide irrigation | Provide irrigation | Provide irrigation | |
| Cold wave | | | | |
| Wheat, Pigeonpea, Lentil, Potato, Pulses | | Light irrigation, Mulching | | |
| Horticulture | | | | |
| Bhendi, Brinjal, Chili, Tomato, Bottle guord | | Light irrigation, Mulching Smoke generation to generate heat | | |
| Frost | | | | |
| Wheat, Chickpea, Pigeonpea, Lentil | | Light irrigation, Mulching | | |
| Horticulture | | | | |
| Bhendi, Brinjal, Chilli | | Light irrigation, Mulching | | |
| Tomato & Potato | | Earth up to 15cm ht. Light irrigation, | | Harvest in dry |

| | | | | |
|------------------|----------------|----------|--|---------|
| | | Mulching | | weather |
| Hailstorm | Not Applicable | | | |
| 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 | <ol style="list-style-type: none"> 1. Planning of Cultivation of fodder tree to combat such situation 2. Storage of Improved Quality Fodder <ul style="list-style-type: none"> • Conservation & Storage of Feed & Fodder, Hay and Silage: 3. Development & storage of: – <ol style="list-style-type: none"> (a) Complete Feed Block (b) Urea-Molasses-Mineral-Block | <ol style="list-style-type: none"> 1. Feeding of Complete Feed Block 2. Feeding of Urea-Molasses-Mineral-Block & Fodder 3. Feeding of stored Hay/Silage/Improved Quality Fodder 4. Feeding of Tree leaves | Production of forage crops <ol style="list-style-type: none"> 1. Balanced feeding of Animal supported with little higher concentrate mixture 2. Cultivation of fodder Rabi maize if water stagnated upto Nov/ December 3. Jowar/Cowpea 4. Maize in September |
| Drinking water | Storage of water in reservoir | Drinking of stored water with salt | |
| Health and disease management | Normal vaccination schedule Veterinary Preparedness with Medicines, Vaccines and provision for mobile ambulatory van. The Govt. should take steps to procure sufficient quantity of essential life saving medicines. List of life saving Medicines Corticosteroids Nikethamide Antibloat | Putting ice block on head of animal Thatching of roof of animal shelter Hanging moist gunny bag around shelter Animal safety, Health camp and Treatment | Treatment, health camps Culling of Sick animals and disposal of carcass |

| | | | |
|--------------------------------|---|--|--|
| | Adrenaline Antihistaminic Antidotes for common poisoning Antisnake venom Broad spectrum antibiotics Anti-inflammatory Antipyretic and Analgesics Fluids and Electrolytes | | |
| Floods | Not applicable | | |
| Cyclone | Not applicable | | |
| Heat wave and cold wave | - | | |

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 | Storage of adequate feed in advance | Feeding the balanced diet with mineral mixture | | |
| Drinking water | Storage of water in reservoir | Drinking of water | | |
| Health and disease management | Vaccines to be used for Poultry Mareks disease vaccine RDV (F ₁ & R ₂ B), FPV, IBRV & IBDV | An emergency kit for poultry should be made ready well in advance. The Poultry kit should have Cage, mask, mash, pellet feed trough, waterers, detergents, poultry vaccines, Veterinary drugs, workers protection uniform etc. | Culling of Sick birds and disposal of dead. | |
| Floods | - | | | |
| Cyclone | - | | | |
| Heat wave and cold wave | - | | | |

^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 | (i) Thinning of population (ii) Arrangement of water supply from external resource | (i) Partial harvesting (ii) Addition of water (iii) Stocking of air breathing fishes | (i) Maintenances of remaining stock till favorable condition achieved (ii) If not feasible, total harvesting or transfer of fishes may be done. (iii) Preparation of the pond for next crop. |
| (ii) Impact of salt load build up in ponds / change in water quality | (i) Regular monitoring of water quality parameter. (ii) Arrangement of aeration (iii) Addition of water from external resource | (i) Arrangement of aeration. (ii) Addition of water a. Monitoring of water quality b. Reduction of manuring according to water level. | |
| 2) Floods | | | |
| A. Capture | | | |
| B. Aquaculture | | | |
| (i) Inundation with flood water | (i) Elevation/ Renovation of pond dyke. (ii) Sale of Table/marketable size fishes (iii) construction of earthen nursery ponds in upland areas | Collection of naturally bred seeds (Spawn /fry /fingerling) from flooded water Stocking in nursery ponds for rearing | -Retain the water in pond immediately after flood through repairing of damaged dyke etc. -Netting of pond -Removal of unwanted, predatory/weed fishes -Sell of large size fishes |
| (ii) Water contamination and changes in water quality | Arrangement of regular water quality monitoring | | |

| | | | |
|---|---|--|--|
| (iii) Health and diseases | (a) Use lime/ potassium permanganate (b) Arrangement of CIFAX and medicines & chemical stock | | -Sampling of fishes and water for disease analysis - Liming, use of drugs/ medicine if required in consultancy of fisheries experts |
| (iv) Loss of stock and inputs (feed, chemicals etc) | Raising the height of dyke by fencing with net and bamboo poles to prevent loss of stock | Arrangement of advance size fingerling/ yearlings for stocking | Stocking of large size fingerlings carp Fertilization of pond and regular feeding of fish Harvesting and sale of fish |
| (v) Infrastructure damage (pumps, aerators, huts etc) | Repairing/ arrangement of alternate safe place to keep pumps aerators etc. | A regular water on the flood and infrastructure facilities. | Re establishment of the infra structural facility. |
| 3. Cyclone / Tsunami | Not Applicable | | |
| 4. Heat wave and cold wave | Not Applicable | | |

^a based on forewarning wherever available