

State: HARYANA

Agriculture Contingency Plan District: AMBALA

| 1.0 District Agriculture profile | | | | |
|---|---|---|------------------------------|-----------------------------------|
| 1.1 | Agro-Climatic/Ecological Zone | | | |
| | Agro Ecological Sub Region (ICAR) | Northern Plain, Hot Subhumid (Dry) Eco-Region (9.1) | | |
| | Agro-Climatic Region (Planning Commission) | Trans Gangetic Plain region (VI) | | |
| | Agro Climatic Zone (NARP)* | Eastern Zone (HR-1) | | |
| | List all the districts falling under the NARP Zone | Panchkula, Ambala, Yamunanagar, Kurukshetra, Karnal, Kaithal, Jind, Panipat, Sonipat, Faridabad, Mewat, Palwal and parts of Rohtak, Jhajjar and Gurgaon | | |
| | Geographical coordinates of district | Latitude | Longitude | Altitude |
| | | 30 ^o 20 59.14'' N | 76 ^o 50 01.26'' E | 301 m |
| | Name and Address of the concerned ZRS/ZARS/RARS/RRTTS | ZRS, Karnal-132001 | | |
| | Mention the KVK located in the district | KVK, Ambala-PIN-134 003 | | |
| 1.2 | Rainfall | Average (mm) | Normal Onset | Normal Cessation |
| | SW monsoon (June-Sep): | 682.9 | 1 st week of July | 3 rd week of September |
| | NE Monsoon(Oct-Dec): | 38.9 | - | - |
| | Winter (Jan- March) | 77.2 | | |
| | Summer (Apr-May) | 35.5 | | |
| | Annual: | 834.5 | | |

* If a district falls in two NARP zone, mention the zone in which more than 50% area falls.

| 1.3 | Land use pattern of the district (latest statistics) | Total geographical area | Forest area | Land under non-agricultural use | Permanent pastures | Cultivable waste land | Land under Misc. tree crops and groves | Barren and uncultivable land | Current fallows | Other fallows |
|-----|--|-------------------------|-------------|---------------------------------|--------------------|-----------------------|--|------------------------------|-----------------|---------------|
| | Area (000 ha) | 154 | 1 | 17 | 1 | | | 3 | | - |

(Source: Statistical Abstract Haryana: 2007-08)

| 1.4 | Major Soil types | Area ('000 ha) | Per cent (%) of total area |
|-----|------------------|----------------|----------------------------|
| | Sandy loam soils | 158 | 78 |
| | Loamy sand soils | 43 | 22 |
| | Total | 201 | |

| 1.5 | Agricultural land use | Area ('000 ha) | Cropping intensity % |
|-----|--------------------------|----------------|----------------------|
| | Net sown area | 132 | 156 |
| | Area sown more than once | 74 | |
| | Gross cropped area | 206 | |

| 1.6 | Irrigation | Area ('000 ha) | | |
|-----|------------------------------|----------------|----------------|--------|
| | Net irrigated area | 112 | | |
| | Gross irrigated area | 186 | | |
| | Rainfed area | 20 | | |
| | Sources of Irrigation | Number | Area ('000 ha) | % area |
| | Canals | | 15 | 13.4 |

| | | | |
|---|--------------------|--------|------------------|
| Tanks | - | - | - |
| Open wells | - | - | - |
| Bore wells | - | 96 | 85.7 |
| Lift irrigation | - | - | - |
| Other sources | - | 1 | 0.9 |
| Total | - | 112 | - |
| Pumpsets | 23843 | - | - |
| Micro-irrigation | | | - |
| Groundwater availability and use | No. of blocks | % area | Quality of water |
| Over exploited* | - | - | - |
| Critical | 1 | 25 | - |
| Semi- critical | 2 | 50 | - |
| Safe | 1 | 25 | - |
| Wastewater availability and use | NA | | |
| Ground water quality | Alkaline in nature | | |

*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))

| 1.7 | Major Field Crops cultivated | Area ('000 ha)* | | | | | | | |
|------------------------------------|------------------------------|-----------------|---------|-------|-----------|---------|-------|--------|-------------|
| | | Kharif | | | Rabi | | | Summer | Grand Total |
| | | Irrigated | Rainfed | Total | Irrigated | Rainfed | Total | | |
| Wheat | - | - | - | 81.7 | - | - | - | 81.7 | |
| Rice | 75.7 | - | - | - | - | - | - | 75.7 | |
| Sugarcane | - | - | - | 14.3 | - | - | - | 14.3 | |
| Maize | - | -- | 8.2 | - | - | - | - | 8.2 | |
| Horticulture crops - Fruits | Total area | | | | | | | | |

| | | |
|--|---|-------------------|
| | Mango | 1.1 |
| | Guava | 0.3 |
| | Citrus | 0.2 |
| | Chiku | 0.1 |
| | Horticultural crops - Vegetables | Total area |
| | Potato | 3.1 |
| | Onion | 2.3 |
| | Radish | 2.1 |
| | Cauliflower | 2.0 |
| | Medicinal and Aromatic crops | - |
| | Plantation crops | - |
| | Fodder crops | - |
| | Total fodder crop area | - |
| | Grazing land | - |
| | Sericulture etc | - |

* If break-up data (irrigated, rainfed) is not available, give total area

| 1.8 | Livestock (in number) | Male ('000) | Female ('000) | Total ('000) |
|------------|--|---------------------|----------------------------------|---------------------|
| | Non descriptive Cattle (local low yielding) | - | - | 56 |
| | Crossbred cattle | - | - | - |
| | Non descriptive Buffaloes (local low yielding) | - | - | 216 |
| | Graded Buffaloes | - | - | - |
| | Goat | - | - | 7 |
| | Sheep | - | - | 19 |
| | Others Equine (Horse & Pony) | - | - | - |
| | Commercial dairy farms (Number) | | | - |
| 1.9 | Poultry | No. of farms | Total No. of birds ('000) | |
| | Commercial | 714 | | |
| | Backyard | 25 | | |

| 1.10 | Inland Fisheries | Area (ha) | Yield (t/ha) | Production (tones) |
|------|------------------|-----------|--------------|--------------------|
| | Brackish water | - | - | - |
| | Fresh water | - | - | - |

| 1.11 | Production and Productivity of major crops (Average of last 3 years: 2006,07, 08) | Kharif | | Rabi | | Summer | | Total | |
|------|---|---------------------|----------------------|---------------------|----------------------|---------------------|----------------------|---------------------|----------------------|
| | | Production ('000 t) | Productivity (kg/ha) |
| | Wheat | - | - | 312 | 3806 | - | - | 312 | 3806 |
| | Rice | 261 | 3438 | - | - | - | - | 261 | 3438 |
| | Sugarcane (Gur) | 91 | 6501 | - | - | - | - | 91 | 6501 |
| | Maize | 7 | 2268 | - | - | - | - | 7 | 2268 |
| | Major Horticultural crops | | | | | | | | |
| | Mango | - | - | - | - | - | - | - | 7933 |
| | Guava | - | - | - | - | - | - | - | 850 |
| | Citrus | - | - | - | - | - | - | - | 510 |
| | Chiku | - | - | - | - | - | - | - | 340 |
| | Major Vegetable crops | | | | | | | | |
| | Potato | - | - | 41140 | 13625 | - | - | 41140 | 13625 |
| | Onion | - | - | 27320 | 13346 | - | - | 27320 | 13346 |
| | Radish | - | - | 24577 | 13707 | - | - | 24577 | 13707 |
| | Cauliflower | - | - | 32407 | 17545 | - | - | 32407 | 17545 |

(Source: Statistical Abstract of Haryana)

| 1.12 | Sowing window for 5 major crops | Wheat | Rice | Sugarcane | Maize |
|------|---------------------------------|---------------------------|------------------|--------------------------|-----------------|
| | Kharif- Rainfed | | | | Monsoon onset |
| | Kharif-Irrigated | | 15 May – 30 June | Mid February – End March | 25 June-20 July |
| | Rabi- Rainfed | | | | |
| | Rabi-Irrigated | October end – 15 November | | | |

| 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 with in State as Annexure I | Enclosed: Yes |
| | | Mean annual rainfall as Annexure 2 | Enclosed: Yes |
| | | Soil map as Annexure 3 | Enclosed: No |

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation (No rainfed cultivation)

| Condition | | | Suggested Contingency measures | | |
|--------------------------------------|-------------------------|----------------------|--------------------------------|--------------------|---------------------------|
| Early season drought (delayed onset) | Major Farming situation | Crop/cropping system | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Delay by 2 weeks (Specify month) | | | NA | | |

| Condition | | | Suggested Contingency measures | | |
|--------------------------------------|-------------------------|----------------------|--------------------------------|--------------------|---------------------------|
| Early season drought (delayed onset) | Major Farming situation | Crop/cropping system | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Delay by 4 weeks (Specify month) | NA | | | | |

| Condition | | | Suggested Contingency measures | | |
|--------------------------------------|-------------------------|----------------------|--------------------------------|--------------------|---------------------------|
| Early season drought (delayed onset) | Major Farming situation | Crop/cropping system | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Delay by 6 weeks (Specify month) | NA | | | | |

| Condition | | | Suggested Contingency measures | | |
|--------------------------------------|-------------------------|----------------------|--------------------------------|--------------------|---------------------------|
| Early season drought (delayed onset) | Major Farming situation | Crop/cropping system | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Delay by 8 weeks | NA | | | | |

| Condition | | | Suggested Contingency measures | | |
|--|-------------------------|----------------------|--------------------------------|--|---------------------------|
| Early season drought (Normal onset) | Major Farming situation | Crop/cropping system | Crop management | Soil nutrient & moisture conservation measures | Remarks on Implementation |
| Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc. | NA | | | | |

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

| | | | | | |
|---------------------|----|--|--|--|--|
| period) | | | | | |
| At vegetative stage | NA | | | | |

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

| Condition | | | Suggested Contingency measures | | |
|------------------|-------------------------|----------------------|--------------------------------|--------------------|---------------------------|
| Terminal drought | Major Farming situation | Crop/cropping system | Crop management | Rabi crop planning | Remarks on Implementation |
| | NA | | | | |

2.1.2 Irrigated situation

| Condition | Major Farming situation | Crop/cropping system | Change in crop/cropping system | Suggested Contingency measures | |
|--|--|----------------------|--------------------------------|---|--|
| | | | | Agronomic measures | Remarks on Implementation |
| Delayed/limited release of water in canals due to low rainfall | Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell | Rice-Wheat | No change | Use 10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Marginal ground waters for life saving irrigation Short duration cultivars, Adoption of plant protection measures. | Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on |

| Condition | Major Farming situation | Crop/cropping system | Change in crop/cropping system | Suggested Contingency measures | |
|--|--|----------------------|--|--|---|
| | | | | Agronomic measures | Remarks on Implementation |
| | Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell | | | Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment | sprinkler, drip irrigation systems and laser leveler |
| | | Maize-Wheat | None | -do- | -do- |
| | | Rice-Wheat | No change | -do- | -do- |
| | | Maize-Wheat | None | -do- | -do- |
| | | Sugarcane | Intercropping of Onion/Garlic with Sugarcane | Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters Short duration cultivars, Adoption of plant protection measures, Weed free environment | -do- |
| Condition | Major Farming situation | Crop/cropping system | Change in crop/cropping system | Suggested Contingency measures | |
| Non release of water in canals under delayed onset of monsoon in catchment | Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell | Rice-Wheat | No change | 10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars. Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment | Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler |
| | | Maize-Wheat | None | -do- | -do- |
| | | Rice-Wheat | No change | -do- | -do- |
| | | Maize-Wheat | None | -do- | -do- |
| | | Sugarcane | Intercropping of Onion/Garlic with Sugarcane | Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of | -do- |

| Condition | Suggested Contingency measures | | | | |
|-----------|--------------------------------|----------------------|--------------------------------|---|---------------------------|
| | Major Farming situation | Crop/cropping system | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| | prominently tubewell | | | organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars. Adoption of plant protection measures, Weed free environment | |

| Condition | Suggested Contingency measures | | | | |
|--|--|----------------------|--|---|---|
| | Major Farming situation | Crop/cropping system | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| Lack of inflows into tanks due to insufficient /delayed onset of monsoon | Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell | Rice-Wheat | No change | 10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment | Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler |
| | | Maize-wheat | None | -do- | -do- |
| | Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell | Rice-wheat | No change | -do- | -do- |
| | | Maize-wheat | None | -do- | -do- |
| | | Sugarcane | Intercropping of Onion/Garlic with Sugarcane | Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters. Short duration cultivar. Adoption of plant protection measures Weed free environment | -do- |

| Condition | Major Farming situation | Crop/cropping system | Change in crop/cropping system | Suggested Contingency measures | |
|---|--|----------------------|--|---|---|
| | | | | Agronomic measures | Remarks on Implementation |
| Insufficient groundwater recharge due to low rainfall | Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell | Rice-wheat | No change | 10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment | Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler |
| | | Maize-wheat | None | As above | As above |
| | | Sugarcane | Intercropping of Onion/Garlic with Sugarcane | Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment | Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler |
| | Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell | Rice-wheat | No change | 10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment | Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler |
| | | Maize-wheat | None | As above | As above |
| | | Sugarcane | Intercropping of | Drip/furrow irrigation in sugarcane, paired row planting, optimum | Seeds from State, |

| Condition | Major Farming situation | Crop/cropping system | Suggested Contingency measures | | |
|-----------|-------------------------|----------------------|--------------------------------|--|---|
| | | | Change in crop/cropping system | Agronomic measures | Remarks on Implementation |
| | | | Onion/Garlic with Sugarcane | plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation Conjunctive use of brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment | national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler |

2.2 Unusual rains (untimely, unseasonal etc)

| 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 | | Drainage | Drainage | Shifting to dry place |
| Wheat | Planting on beds and drainage | -do- | -do- | -do- |
| Sugarcane | -do- | -do- | -do- | -do- |
| Vegetables | -do- | -do- | -do- | -do- |
| Maize | Drainage, if depth of standing water is > 5-6 cm | -do- | -do- | -do- |
| Horticulture | | | | |

| | | | | |
|---|--|--|--|---|
| specify crop and give details | <ol style="list-style-type: none"> 1. No adverse effect 2. Removal of unwanted sprouts 3. Spray insecticides & pesticides to control the insect & pest 4. Drain out water if heavy rains | <ol style="list-style-type: none"> 1. Drain out the excess water to avoid flower and fruit drop 2. To control the fruit drop apply foliar application of nutrients and growth regulators 3. Apply insecticide & pesticides to control the insect & pest and diseases on young developing fruits 4. Plough the field to increase the root aeration. | Harvest the fruit crops timely and send to the market immediately. | <ol style="list-style-type: none"> 1. Apply fungicide to avoid post harvest diseases. 2. Proper covering of the produce. 3. Proper grading and cleaning of fruits immediately after harvest. 4. Use the damaged fruits for processing 5. Use water proof packaging |
| Heavy rainfall with high speed winds in a short span | | | | |
| Rice | Drainage, if stagnant water | Drainage | Drainage | Shifting to dry place |
| Wheat | -do- | -do- | -do- | -do- |
| Sugarcane | -do- | -do- | -do- | -do- |
| Vegetables | -do- | -do- | -do- | -do- |
| Maize | Drainage, if depth of standing water is > 5-6 cm | -do- | -do- | -do- |
| Horticulture | | | | |
| (all crops) | Drain out water if heavy rains | <ol style="list-style-type: none"> 1. Drain out the excess water to avoid flower and fruit drop 2. To control the fruit drop apply foliar application of nutrients and growth regulators 3. Apply insecticide & pesticides to control the insect & pest and diseases on young developing fruits 4. Plough the field to increase the root aeration. | Harvest the fruit crops timely and send to the market immediately. | <ol style="list-style-type: none"> 1. Apply fungicide to avoid post harvest diseases. 2. Proper covering of the produce. 3. Proper grading and cleaning of fruits immediately after harvest. 4. Use the damaged fruits for processing 5. Use water proof packaging |

| Outbreak of pests and diseases due to unseasonal rains | | | | |
|---|---|-------------------------------------|---|---|
| Rice : Bacterial leaf blight, blast disease and false smut increases due to rains | Soak 10 kg of seed in 10 lt. water suspension of Emisan / Bavistin 10 gm +1 g Streptocycline for 24 hrs before sowing. No recommendation at vegetative stage for BLB control | Follow recommended control measures | - | - |
| Wheat : Yellow and brown rust of wheat become severe Powdery mildew intensity becomes low to moderate Karnal bunt increases | Spray 600 – 800 gm Mancozeb 200 lt. of water/acre at the appearance of disease and repeat after 15-20 days For powdery mildew control spray 600-800 gm wettable sulphur/200 lt. of water/acre | - | - | - |
| Sugarcane : Red rot becomes severe due to heavy rains | Use disease free setts treated with Emisan containing 6% mercury (Hg) for 4-5 min. or hot steam treated disease free setts | - | - | - |
| Horticulture | | | | |
| Potato: Early and late blight of potato increases with rainfall viral disease decreases | Spray Mancozeb @ 0.25% 4-5 times at an interval of 15 days | - | - | - |

2.3 Floods

| Condition | Suggested contingency measures | | | |
|--|--|-------------------------|---------------------------|-----------------------|
| | Seedling / nursery stage | Vegetative stage | Reproductive stage | At harvest |
| Transient water logging/ partial inundation | | | | |
| Rice | Drainage, if stagnant water | Drainage | Drainage | Shifting to dry place |
| Wheat | -do- | -do- | -do- | -do- |
| Sugarcane | -do- | -do- | -do- | -do- |
| Vegetables | -do- | -do- | -do- | -do- |
| Maize | Drainage, if depth of standing water is > 5-6 cm | -do- | -do- | -do- |

| | | | | |
|--|---|---------------------------|---------------------------|---------------------------|
| Horticulture | | | | |
| Crop1 (specify) | <ul style="list-style-type: none"> ➤ Drain out the flood water ➤ Spray of nutrients/supplementation ➤ Prefer plantation of water logging resistant crop like Jamun. ➤ Mount planting of fruit trees | | | Drain out the flood water |
| Crop2 | | | | |
| Crop3 | | | | |
| Continuous submergence for more than 2 days² | | | | |
| Rice | No adverse effect on crop | No adverse effect on crop | No adverse effect on crop | Shifting to dry place |
| Wheat | -do- | -do- | -do- | -do- |
| Sugarcane | -do- | -do- | -do- | -do- |
| Vegetables | -do- | -do- | -do- | -do- |
| Maize | Drainage, if depth of standing water is > 5-6 cm | -do- | -do- | -do- |
| Horticulture | | | | |
| Crop1 (specify) | <ul style="list-style-type: none"> ➤ Drain out the flood water ➤ Spray of nutrients/supplementation ➤ Prefer plantation of water logging resistant crop like Jamun. ➤ Mount planting of fruit trees | | | Drain out the flood water |
| Crop2 | | | | |
| Crop3 | | | | |
| Sea water inundation | NA | | | |

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 | | | | |
| Rice | Micro-irrigation, avoid irrigation during hot hours with poor quality water | Micro-irrigation avoid irrigation during hot hours with poor quality water | - | |
| Sugarcane | Micro- sprinkler irrigation avoid irrigation during hot hours with poor quality waters | Avoid irrigation during hot hours with poor quality water | Avoid irrigation during hot hours With poor quality water | |
| Maize | Micro- sprinkler irrigation avoid irrigation during hot hours | Avoid irrigation during hot hours | Avoid irrigation during hot hours | |

| | | | | |
|------------------|--|--|--|--|
| Cold wave | | | | |
| Wheat | Irrigation and proper nutrition | Irrigation and proper nutrition | Irrigation and proper nutrition | |
| Vegetables | -do- | -do- | -do- | |
| Maize | -do- | -do- | -do- | |
| Horticulture | | | | |
| Frost | | | | |
| Wheat | Irrigation and proper nutrition | Irrigation and proper nutrition | Irrigation and proper nutrition | |
| Vegetables | Irrigation and proper nutrition, covering the crop with straw or plastic sheet | Irrigation and proper nutrition, covering the crop with straw or plastic sheet | Irrigation and proper nutrition, covering the crop with straw or plastic sheet | |
| Maize | Irrigation and proper nutrition | Irrigation and proper nutrition | Irrigation and proper nutrition | |
| Hailstorm | | | | |
| Horticulture | Provide Anti-hail nets | | | |
| Cyclone | NA | | | |

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 | 1. All Districts should be asked to locate their feed and fodder banks in view of submergence situation arising due to draught. Sufficient care must be taken to sensitize the farmers to protect their feed and fodder much ahead of onset of monsoon. The sources for procurement of feed / rice bran (Kunda) within the district and nearest locations should be identified, and the suppliers kept informed about the emergency situation, which might require action at their level for | 1. The best option is to open fodder depots for milch animals which farmers will never deposit into the cattle camps and establish cattle camps for dry and scrub animals. These camps should be established along assured source of water or canals for drinking and growing fodder. 2. Facilities like storing densified roughages transported from other districts should also be established adjacent to these camps. | 1. Immediate efforts are needed to grow fodder crops like oats, barley, <i>kasni</i> and <i>lucern</i> etc. in the canal command areas. 2. Farmers might have to be compensated for abandoning food or commercial cash crop to meet contingent fodder requirements. |

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| | <p>production and supply to the identified areas within the shortest possible time.</p> <ol style="list-style-type: none"> 2. Complete feed blocks should be prepared and stored in the feed banks for scarcity periods. 3. The livestock holders of small ruminants should be educated/ informed to collect sufficient amount of green leaves from edible plants for use during the period of submergence at the earliest, after receipt of draught warning. The district authorities of Animal Husbandry Department should chalk out a complete programme to cater the feed & fodder needs of livestock. 4. Increase the sown area under fodder crops 5. Looking to scarcity of crop residues, burning of paddy straw and stubbles should not be allowed in Haryana. This can be properly harvested, baled, densified and fortified using 4% urea with molasses and transported to areas of fodder scarcity. Standardized machinery for harvesting, baling, densification and fortification is available with Punjab Agro Federation and in the market. | <ol style="list-style-type: none"> 3. Complete feed blocks stored in the feed banks should be provided to productive, lactating and pregnant animals for scarcity periods 4. Since stall feeding adversely affects the breeding efficiency in case of sheep, therefore, sheep should always be resorted to natural grazing. 5. Special care is required for productive, lactating and pregnant animals. These animals must be supplemented with additional concentrates and fodders. 6. Most of such animals will be retained by the farmers and arrangements for fodder, feed and drinking water should be made accordingly. | |
| Drinking water | <p>Prior to the onset of summer all the water ponds/lakes in the villages/cities should be filled up with canal water/tube wells.</p> | <ol style="list-style-type: none"> 1. All the affected livestock should have an access to clean drinking water. Arrangements are required to be made in this regard with the help of concerned Government functionaries of the Districts. 2. Resorting to alternate day watering to camel, sheep and goats. Experimental evidences show that even watering twice a week did not have much adverse effect on body weight of the sheep. 3. Avoiding long distance grazing, as tired animals need more and frequent watering and feeding. | <p>Normal supply of water should be restored.</p> |
| Health and disease management | | | |
| Floods | | | |
| Feed and fodder | <ol style="list-style-type: none"> 1. All Districts should be asked to locate their feed | <ol style="list-style-type: none"> 1. The best option is to open fodder depots for | <ol style="list-style-type: none"> 1. Immediate efforts are needed to |

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| availability | <p>and fodder banks in view of submergence situation arising due to floods. Sufficient care must be taken to sensitize the farmers to protect their feed and fodder much ahead of onset of monsoon. The sources for procurement of feed / rice bran (Kunda) within the district and nearest locations should be identified, and the suppliers kept informed about the emergency situation, which might require action at their level for production and supply to the identified areas within the shortest possible time.</p> <ol style="list-style-type: none"> 2. Complete feed blocks should be prepared and stored in the feed banks for scarcity periods 3. The livestock holders of small ruminants should be educated/ informed to collect sufficient amount of green leaves from edible plants for use during the period of submergence at the earliest, after receipt of draught warning. The district authorities of Animal Husbandry Department chalk out a complete programme to cater the feed & fodder needs of cattle, buffalo, sheep, goat, pig, dog, poultry birds etc. 4. The livestock holders of livestock are trained regarding shifting of animals before flooding. The farmers are instructed to let loose their animals instead of tying much before flood. 5. Increase the sown area under fodder crops 6. Looking to scarcity of crop residues, burning of paddy straw and stubbles should not be allowed in Haryana. This can be properly harvested, baled, densified and fortified using 4% urea with molasses and transported to areas of fodder scarcity. Standardized machinery for harvesting, bailing, densification and fortification is available with Punjab Agro Federation and in the market. | <p>milch animals which farmers will never deposit into the cattle camps and establish cattle camps for dry and scrub animals. These camps should be established along assured source of water or canals for drinking and growing fodder.</p> <ol style="list-style-type: none"> 2. Facilities like storing densified roughages transported from other parts of the country should also be established adjacent to these camps. 3. Immediate efforts are needed to grow fodder crops like oats, barley, <i>kasni</i> and <i>lucern</i> etc. in the canal command areas. 4. Farmers might have to be compensated for abandoning food or commercial cash crops to meet contingent fodder requirements. 5. Since stall feeding adversely affects the breeding efficiency in case of sheep, therefore, sheep should always be resorted to natural grazing. 6. Special care is required for productive, lactating and pregnant animals. These animals must be supplemented with additional concentrates and fodders. 7. Most of such animals will be retained by the farmers and arrangements for fodder, feed and drinking water should be made accordingly. | <p>grow fodder crops like oats, barley, <i>kasni</i> and <i>lucern</i> etc. in the canal command areas.</p> <ol style="list-style-type: none"> 2. Farmers might have to be compensated for abandoning food or commercial cash crops to meet contingent fodder requirements. 3. After the sheds have dried, these should be disinfected and regular feed of the animals should be introduced gradually. |
| Drinking water | <p>Tube wells should be installed before monsoon to provide underground water to the livestock during flood period.</p> | <p>All the affected livestock and poultry should have an access to clean drinking water. Arrangements are required to be made in this regard with the help of concerned</p> | <p>Normal supply of water should be restored.</p> |

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| | | Government functionaries of the Districts. The available water may be chlorinated if required with help of Halogen Tablet prior to drinking by livestock and poultry. | |
| Health and disease management | | | |
| Cyclone | -NA- | | |
| Feed and fodder availability | | | |
| Drinking water | | | |
| Health and disease management | | | |
| Heat wave and cold wave | | | |
| Shelter/environment management | Necessary arrangement of tatties, gunny bags and tirpal should be made available so as to cover the sheds during heat and cold waves | <ol style="list-style-type: none"> 1. Window of the sheds should be covered with gunny bags, tatties, and tirpal. Electric fans should be provided in the sheds and if possible desert cooler should be provided during heat period. 2. High energy and readily available sources of energy nutrients may be provided in the ration. | Normal shelter should be restored |
| Health and disease management | | | |

2.5.2 Poultry

| | Suggested contingency measures | | |
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| | Before the event | During the event | After the event |
| Drought | | | |
| Shortage of feed ingredients | I. All Districts should be asked to locate their feed banks in view of submergence situation arising due to draught. Sufficient care must be taken to sensitize the farmers to protect their feed and fodder much ahead of onset of monsoon. The sources for procurement of feed / rice bran (Kunda) within the district and nearest locations | Poultry farmers should be provided with sufficient amount of feed ingredients and complete feed during draught situation from the feed banks. | Normal feeding should be restored |

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| | <p>should be identified, and the suppliers kept informed about the emergency situation, which might require action at their level for production and supply to the identified areas within the shortest possible time.</p> <p>II. The district authorities of Animal Husbandry Department should chalk out a complete programme to cater to feed the poultry birds.</p> | | |
| Drinking water | Necessary arrangement for water storage should be made. Hand pumps should be installed around the sheds. Sufficient quantity of electrolytes should be ensured. | All the affected poultry should have an access to clean drinking water. Arrangements are required to be made in this regard with the help of concerned Government functionaries of the Districts. | Normal drinking water restored |
| Health and disease management | | | |
| Floods | | | |
| Shortage of feed ingredients | <p>I. All Districts should be asked to locate their feed banks in view of submergence situation arising due to flood. Sufficient care must be taken to sensitize the farmers to protect their feed much ahead of onset of monsoon. The sources for procurement of feed / rice bran (Kunda) within the district and nearest locations should be identified, and the suppliers kept informed about the emergency situation, which might require action at their level for production and supply to the identified areas within the shortest possible time.</p> <p>II. The poultry farmers should be trained regarding shifting of birds before flood. For shifting of poultry birds to safer places, the farmer should be educated to make suitable cages from bamboos.</p> | Sufficient quantity of feeds stored in the feed banks should be made available to the poultry farmers. | Normal feeding should be restored |
| Drinking water | I. Prior to the onset of monsoon tube wells should be installed in the villages and near to the poultry farms so as to provide underground water during flood. | All the affected poultry should have an access to clean drinking water. Arrangements are required to be made in this regard with the help of concerned Government functionaries of the Districts. The available water may be chlorinated if required with help of Halogen Tablet prior to drinking by livestock and poultry. | Normal drinking water restored |
| Health and disease management | | | |
| Cyclone | -NA- | | |

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| Shortage of feed ingredients | | | |
| Drinking water | | | |
| Health and disease management | | | |
| Heat wave and cold wave | | | |
| Shelter/environment management | Necessary arrangement of tatties, gunny bags and tirpal should be made available so as to cover the sheds during heat and cold waves | 1. Window of the sheds should be covered with gunny bags, tatties, and tirpal. Electric fans should be provided in the sheds and if possible desert cooler should be provided during heat period. 2. High energy and readily available sources of energy nutrients may be provided in the ration. | Normal shelter should be restored |
| Health and disease management | | | |

2.5.3 Fisheries

| | 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 | | | |

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| (i) Shallow water in ponds due to insufficient rains/inflow | Further increase the depth of ponds, store the fish stock in 1 & 2 ponds only. | Sell the big fishes and keep the smaller fishes in one tank. | Stock the young fishes in different tanks, species wise. |
| (ii) Impact of salt load build up in ponds / change in water quality | Continuously add some water from tube well/water source in fish ponds | Do not allow the water level to go below 3.5 feet in fish ponds. | Stock the young fishes in different tanks and keep the water between 3.5 and 6.0 feet. |
| 2) Floods | | | |
| A. Capture | | | |
| Marine | | | |
| Inland | | | |
| (i) No. of boats / nets/damaged | | | |
| (ii) No. of houses damaged | | | |
| (iii) Loss of stock | | | |
| (iv) Changes in water quality | | | |
| (v) Health and diseases | | | |
| B. Aquaculture | | | |
| (i) Inundation with flood water | Boundaries/Bundhs with height >6 feet may be made around fish ponds, will restrict, escape of fishes from ponds | Netout and stock the fishes in one big tanks and make the bundh >6 feet height around the ponds. | Remove the bundh separately and release the fishes, species-wise in tanks. |
| (ii) Water contamination and changes in water quality | Add more fresh water in each tank (tube well/canal), grow aquatic weeds. | Repeatedly filter and recirculate water from stocking tanks | Filter, recirculate and add new fresh water every week, will decrease fish mortality. |
| (iii) Health and diseases | Treat the pond water with KMnO_4 @ 10 ppm in each fish tanks. Add new fresh water periodically. | Disinfect fish ponds with KMnO_4 @ 10g/10,000 liter water fortnightly. | Treatment with KMnO_4 must continue for one month even after flood situation is out. Remove the highly infected fishes from ponds. |
| (iv) Loss of stock and inputs (feed, chemicals etc) | Store the inputs at safer places. | Move stock and inputs to safer places and acquire fresh stock in shortage. | Retain the normal arrangements. |
| (v) Infrastructure damage (pumps, | Make alternate arrangements according | Proper maintenance/repairing of damaged infrastructure or make new | Proper maintenance/repairing of |

| aerators, huts etc) | to the anticipated conditions | arrangements. | damaged infrastructure. |
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| 3. Cyclone / Tsunami | | | |
| A. Capture | | | |
| Marine | | | |
| (i) Average compensation paid due to loss of fishermen lives | | | |
| (ii) Avg. no. of boats / nets/damaged | | | |
| (iii) Avg. no. of houses damaged | | | |
| Inland | | | |
| B. Aquaculture | | | |
| (i) Overflow / flooding of ponds | | | |
| (ii) Changes in water quality (fresh water / brackish water ratio) | | | |
| (iii) Health and diseases | | | |
| (iv) Loss of stock and inputs (feed, chemicals etc) | | | |
| (v) Infrastructure damage (pumps, aerators, shelters/huts etc) | | | |
| 4. Heat wave and cold wave | | | |
| A. Capture | | | |
| Marine | | | |
| Inland | | | |
| B. Aquaculture | | | |
| (i) Changes in pond environment (water quality) | Keep the ponds water fresh by adding fresh tubewell water, regularly. | Showering the water in air and add fresh tube-well water, periodically. | During heat waves, showering is must and also tubewell water. In winter |

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| | | | continue adding of tubewell water with KmNO_4 . |
| (ii) Health and Disease management | Treatment of KMNO_4 @ 10 ppm. Sale out the bigger fishes. | Treatment of KmNO_4 @ 10 ppm. Dump the fishes which were heavily infected | Disinfection with KmNO_4 continues. Sale out all the fishes except, infected ones. Dump the infected fishes in a ditch in the ground. |

Annexure 2: Mean Annual Rainfall

