

State: HARYANA

Agriculture Contingency Plan District: JIND

1.0 District Agriculture profile							
1.1	Agro-Climatic/Ecological Zone						
	Agro Ecological Sub Region (ICAR)	Northern Plain (And Central Highlands) (4.1)					
	Agro-Climatic Region (Planning Commission)	Trans Gangetic Plain region (VI)					
	Agro Climatic Zone (NARP)	Eastern Zone of Haryana (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			
		29°18'37.87" N	76°18'29.13"	243 m MSL			
1.2	Name and Address of the concerned ZRS/ZARS/RARS/RRTTS	ZRS, Rohtak-124 001					
	Mention the KVK located in the district	KVK, Jind -126 102					
	Rainfall	Average (mm)	No. of rainy days	Normal Onset	Normal Cessation		
	SW monsoon (June-Sep):	403.2	-	1 st week of July	3 rd week of September		
	NE Monsoon(Oct-Dec):	17.5	-	-	-		
	Winter (Jan- March)	35.1	-				
	Summer (Apr-May)	31.6	-				
	Annual:	487.4	-				

* 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)	279	1	43	1	-	-	-	-	-

(Source: Statistical abstract of Haryana)

1. 4	Major Soil types	Area ('000 ha)	Per cent (%) of total area
	Sandy loam soils	235	100

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	235	200
	Area sown more than once	235	
	Gross cropped area	470	

1.6	Irrigation	Area ('000 ha)	
	Net irrigated area	213	
	Gross irrigated area	438	
	Rainfed area	22	
	Sources of Irrigation	Number	Area ('000 ha) % area
	Canals		126 59.2
	Tanks	-	-
	Open wells	-	-

Bore wells	-	87	40.8
Lift irrigation	-	-	-
Other sources	-	-	-
Total	-	213	-
Pump sets	-	43732	-
Micro-irrigation		-	-
Groundwater availability and use	No. of blocks	% area	Quality of water
Over exploited*	1	14.3	-
Critical	2	28.6	-
Semi- critical	0	-	-
Safe	4	57.1	-
Wastewater availability and use	NA	-	-
Ground water quality	Ground water is 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
		Irrigated	Rainfed	Irrigated	Rainfed	Total
	Wheat		-	213	-	-
	Rice	93.7	-	-	-	-
	Bajra	54	-	-	-	-
	Cotton	45.8	-	-	-	-
	Rapeseed Mustard		-	-	5.9	-
	Horticulture crops - Fruits	Total area(ha)				
	Citrus	172.0				

Guava	313.0
Ber	257.0
Horticultural crops - Vegetables	Total area('000 ha)
Cauliflower	1.1
Chilli	1.1
Carrot	0.9
Medicinal and Aromatic crops	Total area
Mulhatti	4
Aloe vera	13
Others	3
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)	-	-	121
	Crossbred cattle	-	-	--
	Non descriptive Buffaloes (local low yielding)	-	-	509
	Graded Buffaloes	-	-	--
	Goat	-	-	10
	Sheep	-	-	45
	Others Equine (Horse &Pony)	-	-	20
	Commercial dairy farms (Number)			--
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial		4369	
	Backyard		71	
1.10	Fisheries			

A. Capture						
i) Marine (Data Source: Fisheries Dept.)	No. of fishermen	Boats		Nets		Storage facilities (Ice plants etc.)
		Mechanized	Non-mechanized	Mechanized (Trawl nets, Grill nets)	Non-mechanized (Shore seines, stake & trap nets)	
-	-	-	-	-	-	NA
ii) Inland (Data Source: Fisheries Dept.)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
	NA		NA		NA	
B. Culture						
		Water Spread Area (ha)		Yield (t/ha)		Production ('000 tons)
i) Brackish water (Data source: MPEDA/Fisheries Dept.)		NA		NA		NA
ii) Fresh water (Data source: Fisheries Dept.)						
Others						

1.11 Production and Productivity of major crops (Average of last 3 years: 2006-07, 2007-08, 2008-09)

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			897	4212	-	-	897	4212
	Rice	248	2633			-	-	248	2633
	Bajra	109	2023			-	-	109	2023
	Cotton	137	506			-	-	137	506
	Rapeseed Mustard			7	708	-	-	7	708
	Major Horticultural crops		-	-	-	-	-	-	-
	Citrus	1020	-	-	-	-	-	-	-
	Guava	2010	-	-	-	-	-	-	-
	Ber	1470	-	-	-	-	-	-	-

(Source: Statistical abstract of Haryana)

1.12	Sowing window for 5 major crops (start and end of sowing period)	Wheat	Rice	Bajra	Cotton	Rapeseed & Mustard
Kharif- Rainfed	-	-	Onset of rain	-	-	-
Kharif-Irrigated	-	15 May – 30 June	1 st July -15 July	15 April – 7 July	-	-
Rabi- Rainfed	October end – November end	-	-	-	-	September end
Rabi-Irrigated	October end – 15 November	-	-	-	-	September end – 20 October

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

Condition		Crop/cropping system	Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation		Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
Delay by 2 weeks (July 3rd week)	Light textured sandy soils susceptible to wind erosion	Pearl millet: HHB-94, HHB-197, HHB-67 (Improved) Pearl millet + Greengram- Satya, Muskan, Bharpai / Mothbean: RMO 40 (Intercropping 8:4/6:3) Clusterbean: HG-563, HG-365 Cowpea: Charodi for grain and CS-88 for fodder Castor: CH-1 Sesame: HT-1 Note- Clusterbean can also intercropped with Pearl millet as above.	No change	-	-
			No change	-	

Condition		Crop/cropping system	Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation		Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
Delay by 4 weeks (Aug 1st week)	Light textured sandy soils susceptible to wind erosion	Pearl millet: HHB-94, HHB-197, HHB-67 (Improved) Pearl millet + Greengram- Satya, Muskan, Bharpai / Mothbean: RMO 40 (Intercropping 8:4/6:3) Clusterbean: HG-563, HG-365 Cowpea: Charodi for grain and CS-88 for fodder Castor: CH-1 Sesame: HT-1 Note- Clusterbean can also intercropped with Pearl millet as above.	Don't grow Clusterbean beyond mid July.	-	-

Suggested Contingency measures					
Condition	Major Farming situation	Crop/cropping system	Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 6 weeks (Aug 3rd week)	Light textured sandy soils susceptible to wind erosion	Pearl millet: HHB-94, HHB-197, HHB-67 (Improved) Pearl millet + Greengram- Satya, Muskan, Bharpai / Mothbean: RMO 40 (Intercropping 8:4/6:3) Clusterbean: HG-563, HG-365 Cowpea: Charodi for grain and CS-88 for fodder Castor: CH-1 Sesame: HT-1 Note- Clusterbean can also intercropped with Pearl millet as above.	Don't grow sesame beyond mid August.	-	-

Suggested Contingency measures					
Condition	Major Farming situation	Crop/cropping system	Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 8 weeks (Sept. 1st week)	Light textured sandy soils susceptible to wind erosion	Pearl millet: HHB-94, HHB-197, HHB-67 (Improved) Pearl millet + Greengram- Satya, Muskan, Bharpai / Mothbean: RMO 40 (Intercropping 8:4/6:3) Clusterbean: HG-563, HG-365 Cowpea: Charodi for grain and CS-88 for fodder Castor: CH-1 Sesame: HT-1 Note- Clusterbean can also intercropped with pearl millet as above.	Keep fallow	Conserve soil moisture for <i>rabi</i> <td>-</td>	-

Suggested Contingency measures					
Condition	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Early season drought (Normal onset)					
Normal onset	Light textured	Pearl millet: HHB-94, HHB-197,	i) In case of poor plant	-	In case of such

followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	sandy soils susceptible to wind erosion	HHB-67 (Improved)	population (<two-third), go for re-sowing as and when rains resume. ii) Gap filling by transplanting under rainy conditions.		situation: i) State Agriculture Department should make arrangement for seeds to meet the exigency at block level. ii) Release of irrigation water in canals and proper power supply may be insured by concerned departments iii) Subsidy on sprinkler, drip irrigation systems and laser leveler
		Pearl millet + Greengram- Satya, Muskan, Bharpai / Mothbean: RMO-40 (Intercropping 8:4/6:3)	In case of poor plant population (<two-third), go for re-sowing as and when rains resume.	-	
		Clusterbean: HG-563, HG-365 Cowpea: Charodi for grain and CS-88 for fodder Castor: CH-1 Sesame: HT-1 Note- Clusterbean can also intercropped with Pearl millet as above.	-do-	-	

Condition	Major Farming situation	Crop/cropping system	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	Pearl millet: HHB-94, HHB-197, HHB-67 (Improved)	i) Weeding and hoeing with <i>wheel hand hoe/ kasola</i> as and when required. ii) Thinning to reduce 1/3 rd population.	<i>In-situ/ex-situ</i> moisture conservation: i) Apply life saving irrigation of 4-5 cm, if possible. ii) Foliar spray of urea (2.5 % at 30-35 DAS).	i) Release of irrigation water in canals and proper power supply may be insured by concerned
		Pearl millet + Greengram- Satya, Muskan, Bharpai / Mothbean: RMO 40 (Intercropping 8:4/6:3)	i) Don't use chemicals for weed management under stress. ii) Weeding and hoeing with <i>wheel hand hoe/ kasola</i> as and when required.	Apply life saving irrigation of 4-5 cm, if possible.	

		ii) Straw mulching in between rows. Clusterbean: HG-563, HG-365 Cowpea: Charodi for grain and CS-88 for fodder Castor: CH-1 Sesame: HT-1 Note- Clusterbean can also intercropped with pearl millet as above.	ii) Straw mulching in between rows. i) Don't use chemicals for weed management under stress. ii) Weeding and hoeing with wheel hand hoe/ kasola as and when required. ii) Straw mulching in between rows.	-do-	departments ii) Subsidy on sprinkler, drip irrigation systems and laser leveler
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Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At reproductive stage	Light textured sandy soils susceptible to wind erosion	Pearl millet: HHB-94, HHB-197, HHB-67 (Improved)	i) Remove every third row for green fodder. ii) Make ridge and furrow for rain water harvesting. iii) Life saving irrigation if available.	-	None
		Pearl millet + Greengram- Satya, Muskan, Bharpai / Mothbean: RMO 40 (Intercropping 8:4/6:3)	-do-	-do-	-do-
		Clusterbean: HG-563, HG-365 Cowpea: Charodi for grain and CS-88 for fodder Castor: CH-1 Sesame: HT-1 Note- Clusterbean can also intercropped with pearl millet as above.	-do-	-do-	-do-

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi crop planning	Remarks on Implementation
Terminal drought (Early withdrawal of monsoon)	Light textured sandy soils susceptible to wind erosion	Pearl millet: HHB-94, HHB-197, HHB-67 (Improved)	Remove every third row for green fodder. Make ridge and furrow for rain water harvesting. Life saving irrigation if available. Foliar spray of urea 2% solution under rainfed condition.	Field preparation for rabi crop sowing during first fortnight of Oct. Sowing of Mustard (RH-30, RH -819, RB-24, RB 50 RH- 781 and Varuna) and Chickpea (C-235, H-208 and HC-1) during second fortnight of Oct.	The State Agriculture Department should have advance arrangements for timely supply of seed, fertilizer and other agro-inputs to farmers at block level.
		Pearl millet + Greengram- Satya, Muskan, Bharpai / Mothbean: RMO 40 (Intercropping 8:4/6:3)	-do-	-do-	Breeder seed: Dept of Plant Breeding, CCSHAU, Hisar
		Clusterbean: HG-563, HG-365 Cowpea: Charodi for grain and CS-88 for fodder Castor: CH-1 Sesame: HT-1 Note- Clusterbean can also intercropped with pearl millet as above.	-do-	-do-	

2.1.2 Irrigated situation

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		Remarks on Implementation
			Change in crop/cropping system	Agronomic measures	
Delayed/ limited release of water in canals due to	Upland Alluvial soils heavy textured, tube well	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,	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation.

Condition	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
low rainfall	and canal irrigated			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	Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
				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	
				Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Upland Alluvial soils heavy textured, tube well and canal irrigated	Rice-Wheat	No change	10-15% higher seed rate 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, 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, 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 sprinkler, drip irrigation systems and laser leveler.
				Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, planting on beds, straw mulching in sugarcane 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
				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	Upland Alluvial soils heavy textured, tube well and canal irrigated	Rice-Wheat	Cotton-Wheat	10-15% higher seed rate, 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, 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 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 sprinkler, drip irrigation systems and laser leveler
		Sugarcane	Pearlmillet- Rapeseed & Mustard		-do-

Condition	Suggested Contingency measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low	Upland Alluvial soils, tube well and	Rice-Wheat	Cotton/ Pearlmillet-Wheat	10-15% higher seed rate, 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	Seeds from State, national seed and private seed agencies. The schemes of NREGS,

Condition	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
rainfall	canal irrigated			Limited ground water use, prefer life saving irrigation Short duration cultivars, 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, Plant protection measures.	RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Sugarcane	Pearlmillet-Rapeseed & Mustard	Drip/furrow irrigation, paired row planting, optimum plant spacing, planting on beds, 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-

2.2 Unusual rains (untimely, unseasonal etc)

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Rice	Drainage, if depth of standing water is > 5-6 cm	Drainage	Drainage	Shifting to dry place
Wheat	Planting on beds and drainage	-do-	-do-	-do-
Sugarcane	-do-	-do-	-do-	-do-
Rapeseed-mustard	-do-	-do-	-do-	-do-
Cotton	-do-	-do-	-do-	-do-
Pearlmillet	-do-	-do-	-do-	-do-
Horticulture				

All crops	<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	Planting on beds and drainage	-do-	-do-	-do-
Sugarcane	-do-	-do-	-do-	-do-
Rapeseed-mustard	-do-	-do-	-do-	-do-
Cotton	Drainage, if stagnant water	-do-	-do-	-do-
Pearlmillet	-do-	-do-	-do-	-do-
Horticulture				
All crops	<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 fruits 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				
Wheat : Yellow and brown rust of wheat become severe Karnal bunt infection increases under moist conditions	Spray 600 – 800 gm Mancozeb 200 lt. of water/acre at the appearance of disease and repeat after 15-20 days			Treat wheat seed with Raxil 2DS @ 1 gm/kg before sowing to control Karnal bunt
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		
Bajra : Downy mildew incidence increases	There is no control measure except resistant varieties			
Cotton : Bacterial leaf blight increases due to rainfall from traces to moderate intensity whereas cotton leaf curl virus decreases	Soak 5 -6 kg delimited and limited cotton seed in 10 lt. of water suspension containing 5 g Emisan + 1 gm Streptocycline sulphate for 2 hrs. and 6-8 hrs respectively before sowing..			
Indian Mustard: White rust and Alternaria leaf blight increase, stem rot increases due to rain and cold weather	Spray Mancozeb 0.2% 3-4 times at an interval of 15 days to control white rust and Alternaria leaf blight.	To control stem rot spray 0.2% Carbendazim.		
Horticulture				
Potato: Early blight of potato increases with rainfall	Spray Mancozeb @ 0.25% 4-5 times at an interval of 15 days			

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Wheat	Surface drainage	Drainage	Drainage	Shifting to dry place
Rice	-do-	-do-	-do-	-do-
Cotton	-do-	-do-	-do-	-do-
Pearlmillet	-do-	-do-	-do-	-do-
Rapeseed-mustard	-do-	-do-	-do-	-do-

Horticulture				
All crops	➤ 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
Continuous submergence for more than 2 days²				
Wheat	Surface drainage	Drainage	Drainage	Shifting to dry place
Rice	-do-	-do-	-do-	-do-
Cotton	-do-	-do-	-do-	-do-
Pearlmillet	-do-	-do-	-do-	-do-
Sorghum	-do-	-do-	-do-	-do-
Horticulture				
All crops	➤ 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
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 waters	Micro-irrigation, avoid irrigation during hot hours with poor quality waters	-	
Cotton	Micro-drip irrigation	Deep irrigation	Deep irrigation	
Pearlmillet	Micro-sprinkler irrigation, avoid irrigation during hot hours with poor quality waters	Avoid irrigation during hot hours with poor quality waters	Avoid irrigation during hot hours with poor quality waters	
Sugarcane	-do-	-do-	-do-	
Horticulture				
All crops	Micro-irrigation, avoid irrigation during hot hours with poor quality waters	-do-	-do-	

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Cold wave				
Wheat	Irrigation, balanced fertilizer application, Foliar spray of nutrients	Irrigation, fertilizer application	Irrigation, fertilizer application	
Raya	-do-	-do-	-do-	
Sugarcane	-do-	-do-	-do-	
Barley	-do-	-do-	-do-	
Fodder	-do-	-do-	-do-	
Horticulture				
All crops	Apply frequent irrigation, shelterbelt and windbreaks	Apply frequent irrigation, windbreaks	Apply frequent irrigation	-
Frost				
Wheat	No adverse effect			
Sugarcane	-do-			
Raya	Irrigate the crop Create smoke during late evening	Irrigate the crop Create smoke during late evening	Irrigate the crop Create smoke during late evening	
Chickpea	-do-	-do-	-do-	
Barley	-do-	-do-	-do-	
Fodder	-do-	-do-	-do-	
Horticulture				
All crops	1. Apply light irrigation frequently 2. Creating smoke in the orchard during late evening. 3. Thatching of young plants during severe cold months. 4. Use of sprinkler irrigation. 5. Use of mulching under plant canopy			
Hailstorm	i. Plantation of wind breakers ii. Use of hailstorm nets iii. Supplementation of nutrients to the trees			
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	<p>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 production and supply to the identified areas within the shortest possible time.</p> <p>2. Complete feed blocks should be prepared and stored in the feed banks for scarcity periods.</p> <p>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.</p> <p>4. Increase the sown area under fodder crops</p> <p>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</p>	<p>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.</p> <p>2. Facilities like storing densified roughages transported from other districts should also be established adjacent to these camps.</p> <p>3. Complete feed blocks stored in the feed banks should be provided to productive, lactating and pregnant animals for scarcity periods</p> <p>4. Since stall feeding adversely affects the breeding efficiency in case of sheep, therefore, sheep should always be resorted to natural grazing.</p> <p>5. Special care is required for productive, lactating and pregnant animals. These animals must be supplemented with additional concentrates and fodders.</p> <p>6. Most of such animals will be retained by the farmers and arrangements for fodder, feed and drinking water should be made accordingly.</p>	<p>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.</p> <p>2. Farmers might have to be compensated for abandoning food or commercial cash crop to meet contingent fodder requirements.</p>

	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.		
Drinking water	Prior to the onset of summer all the water ponds/lakes in the villages/cities should be filled up with canal water/tube wells.	<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. 	Normal supply of water should be restored.
Health and disease management			
Floods			
Feed and fodder availability	<ol style="list-style-type: none"> 1. All Districts should be asked to locate their feed 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. 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 	<ol style="list-style-type: none"> 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 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 	<ol style="list-style-type: none"> 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 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.

	<p>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.</p> <p>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 tieing much before flood.</p> <p>5. Increase the sown area under fodder crops</p> <p>6. Looking to scarcity of crop residues, burning of paddy straw and stubbles should not be allowed in Haryana. This can be properly harvested, bailed, densification and fortification is available with Punjab Agro Federation and in the market.</p>	<p>supplemented with additional concentrates and fodders.</p> <p>7. Most of such animals will be retained by the farmers and arrangements for fodder, feed and drinking water should be made accordingly.</p>	
Drinking water	Tube wells should be installed before monsoon to provide underground water to the livestock during flood period.	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 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 supply of water should be restored.
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		
	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 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. II. The district authorities of Animal	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

	Husbandry Department should chalk out a complete programme to cater to feed the poultry birds.		
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	<p>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.</p>	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-		
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	NA		
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	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	NA		
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/bunds with height >6 feet may be made around fish ponds, will restrict, escape of fishes from ponds	Net-out and stock the fishes in one big tanks and make the bund >6 feet height around the ponds.	Remove the bund 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 re-circulate water from stocking tanks	Filter, re-circulate 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.
3. Cyclone / Tsunami	NA		
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	NA		
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

			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 I
Location map of district in the state of Haryana



Annexure 2: Rainfall Map

