State: HARYANA

Agriculture Contingency Plan: GURGAON

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	North Punjab plain, Ganga-Yamuna Doab and Rajasthan upland, hot, dry, semi-arid eco-subregion (4.1)		
	Agro-Climatic Region (Planning Commission)	Trans Gangetic Plain region (VI)		
	Agro Climatic Zone (NARP)	Western Zone (HR-2)		
	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
		28º29'34.32" N	77º05'31.84" E	264 m
	Name and Address of the concerned ZRS/ZARS/RARS/RRTTS	CCSHAU, RRS, Bawal Rewari-123 501		
	Mention the KVK located in the district	Krishi Vigyan Kendra, Sikohpur, Gurgaon, Pin-122 001		
1.2	**Rainfall**	Average (mm)	Normal Onset (week and month)	Normal Cessation (week and month)
	SW monsoon (June-Sep):	619.9	1st week of July	3rd week of September
	NE Monsoon(Oct-Dec):	24.9	-	-
	Winter (Jan- March)	42.1		
	Summer (Apr-May)	45.6		
	Annual:	732.5		

1.3	**Land use pattern of the district** (latest statistics)	Total geographical area	Cultivable 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)	120	84	4	31	1	-	0.2	0.05	0.3	-

(Source: Statistical Abstract Haryana: 2007-08)

1. 4	**Major Soil types**	Area ('000 ha)	Per cent (%) of total geographical area
	Sandy loam soils	-	-
	Loamy sand soils	101	84.2

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	84	144
	Area sown more than once	37	
	Gross cropped area	121	

1.6	**Irrigation**	Area (‘000 ha)			
	Net irrigated area	76			
	Gross irrigated area	113			
	Rainfed area	8			
	Sources of Irrigation	Number	Area (‘000 ha)		% area
	Canals		1		1.3
	Tanks	-	-		-
	Open wells	-	-		-
	Bore wells		75		98.7
	Lift irrigation	-	-		-
	Other sources	-	-		-
	Total		76		-
	Pumpsets	23348			-
	Micro-irrigation	-			-
	Groundwater availability and use	No. of blocks	% area	Quality of water	
	Over exploited*	4	100		
	Critical	Nil			
	Semi- critical	Nil			
	Safe	Nil			
	Wastewater availability and use	-			
	Ground water quality	Alkaline in nature and moderately to highly saline			

*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%

1.7	**Major Field Crops cultivated**	**Area ('000 ha)***					
		Kharif		***Rabi***		**Summer**	**Total**
		Irrigated	***Rainfed***	***Irrigated***	***Rainfed***		
	Wheat						49.8
	Bajra						32.8
	Rapeseed Mustard						22
	Rice						2.1
	Horticulture crops - Fruits	**Total area**					
	Guava	0.5					
	Aonla	0.3					
	Ber	0.3					
	Horticultural crops - Vegetables	**Total area**					
	Chilli	2.2					
	Tomato	1.7					
	Radish	1.1					
	Medicinal and Aromatic crops	**Total area**					
	Jatropha	0.2					
	Mulhatti	0.002					
	Aloe vera	0.02					
	Lemon grass+Palmarosa	-					
	Others	0.003					
	Plantation crops	**-**					
	Fodder crops	**Total area**					
	Total fodder crop area	-					
	Grazing land	-					
	Sericulture etc	-					
	Others (Specify)	-					

1.8	**Livestock** (2008-09)	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Cattle			31
	Buffaloes total			132
	Commercial dairy farms	-	-	-
	Goat			14
	Sheep			7
	Others (Camel, Pig, Yak etc)			20
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	-	933	
	Backyard	-	2	

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

1.11Production and Productivity of major crops (Average of years: 2004-05, 2005-06 and 2006-07)

1.11	**Major Field Crops cultivated**	**Kharif**		**Rabi**		**Summer**		**Total**	
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
	Wheat	-	-	183.6	3680	-	-	183.6	3680
	Bajra	46.8	1425	-	-	-	-	46.8	1425
	Rapeseed Mustard	-	-	27.2	1240	-	-	27.2	1240
	Rice	6.5	3088	-	-	-	-	6.5	3088

	Major Horticultural crops								
	Guava	-	-	-	-	-	-	4.7	-
	Aonla	-	-	-	-	-	-	1.6	-
	Ber	-	-	-	-	-	-	2.7	-
	Major Vegetable crops								
	Chilli	3296	1468	-	-	-	-	3296	1468
	Tomato	-	-	26860	16007	-	-	26860	16007
	Radish	20177	18910	-	-	-	-	20177	18910

(Source: Deputy Director Agriculture, Gurgaon)

1.12	**Sowing window for 5 major crops** (start and end of sowing period)	**Wheat**	**Rice**	**Bajra**	**Rapeseed & Mustard**	**Cluster bean(Guar)**
	Kharif- Rainfed	-	-	Onset of rain	-	
	Kharif-Irrigated	-	15th May – 30th June	1st -15th July	-	
	Rabi- Rainfed	October end – November end	-	-	September end	
	Rabi-Irrigated	October end – 15th November	-	-	September end – 20th 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 inundation	-	-	√
	Pests and diseases (specify)	-	√	-
	Others (Specify)	-	-	-

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: Yes / No

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

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 2 weeks (July 3rd week)	Light textured sandy soils susceptible to wind erosion	Pearl millet	No change	No change	
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)	No change	No change	
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with Pearlmillet as above.	No change	No change	

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 4 weeks (August 1st week)	Light textured sandy soils susceptible	Pearl millet	Don't grow Clusterbean beyond mid July.	No change	
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)		No change	
		Clusterbean Cowpea		No change	

	to wind erosion	Castor Sesame Clusterbean can also intercropped with Pearlmillet as above.			

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 (August 3rd week)	Light textured sandy soils susceptible to wind erosion	Pearl millet	Don't grow sesame beyond mid August.	No change	
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)		No change	
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with Pearlmillet as above.		No change	

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 8 weeks (September 1st week)	Light textured sandy soils susceptible to wind erosion	Pearl millet	Keep fallow	Conserve soil moisture for *rabi* sowing	-
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)	-do-	-do-	
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with Pearlmillet as above.	-do-	-do-	

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal 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.	Light textured sandy soils susceptible to wind erosion	Pearl millet	• In case of poor plant population (<two-third), go for re-sowing and when rains resume. • Gap filling by transplanting under rainy conditions.		• State Agriculture Department should make arrangement for seeds to meet the demand at block level. • Release of irrigation water in canals and proper power supply may be ensured by concerned departments Subsidy on sprinkler, drip irrigation systems and laser leveler
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)	In case of poor plant population (<two-third), go for re-sowing as and when rains resume.	-	
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with Pearlmillet as above.	-do-	-	

Condition			**Suggested Contingency measures**		
Mid season drought **(long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)**	**Major Farming situation**	**Normal Crop /cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Light textured sandy soils susceptible to wind erosion	Pearl millet	• Weeding and hoeing with *wheel hand hoe/ kasola* as and when required. • Thinning to reduce 1/3rd population.	*In-situ/ex-situ* moisture conservation: i) Apply life saving irrigation of 4-5 cm, if possible. ii) Foliar spray of urea (2.5 %	• Release of irrigation water in canals and proper power supply may be

				at 30-35 DAS).	insured by concerned departments • subsidy on sprinkler, drip irrigation systems and laser leveler
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)	• Don't use chemicals for weed management under stress. • Weeding and hoeing with wheel hand hoe/ kasola as and when required.	Apply life saving irrigation of 4-5 cm, if possible. Straw mulching in between rows.	
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with pearlmillet as above.	• Don't use chemicals for weed management under stress. • Weeding and hoeing with wheel hand hoe/ kasola as and when required.	-do-	

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 reproductive stage	Light textured sandy soils susceptible to wind erosion	Pearl millet	• Remove every third row for green fodder. • Life saving irrigation if available.	Make ridge and furrow for rain water harvesting	-
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)	-do-	-do-	-
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with Pearlmillet as above.	-do-	-do-	-

Condition			Suggested Contingency measures		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Crop/cropping system**	**Crop management**	**Rabi crop planning**	**Remarks on Implementation**
	Light textured sandy soils susceptible to wind erosion	Pearl millet	• 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	• Field preparation for rabi crop sowing during first fortnight of October • 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 October	The State Agriculture Department should have advance arrangements for timely supply of seed, fertilizer and other agro-inputs to farmers at block level. Breeder seed: Dept of Plant Breeding, CCSHAU, Hisar
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)	-do-	-do-	
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with Pearlmillet as above.	-do-	-do-	

2.1.2 Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed/ limited release of water in canals due to low rainfall	Sandy soils/sandy loam soils canal irrigated	Pearlmillet-Wheat	Pearlmillet+Moong - Raya	• 10-15% higher seed rate, Sprinkler irrigation • Planting on beds, planting with ridge seeder, Laser land leveling, Conjunctive use of canal and ground waters. • Split application of fertilizers • Straw mulching • Limited ground water use, prefer life saving irrigation • Short duration cultivars	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in

				• Soaking of wheat seeds before sowing • Seed treatment with Azotobactor/Rhizobium, • Deep ploughing during kharif season, Shallow irrigation of 4-5 cm depth, • Weed free environment	operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Pearlmillet-Chickpea	Clusterbean-Barley	-do-	
		Fallow -Raya	Summer Moong-Raya	• Short duration cultivars • Seed treatment with Azotobactor/Rhizobium, • Straw mulching • Sprinkler irrigation, Planting on beds, planting with ridger seeder, land leveling • Conjunctive use of canal and ground water • Limited ground water use, prefer life saving irrigation, Weed free environment	
	Well drained, medium alluvial soils, canal irrigated	Clusterbean-Wheat	Cotton-Wheat	• Drip/furrow irrigation in Cotton, paired row planting • Sprinkler in wheat, Planting on beds, Straw mulching in cotton, Planting on beds Planting with ridger seeder • Laser land leveling, Split application of fertilizer, Straw mulching in sugarcane, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars • Soaking of wheat seeds before sowing, Seed treatment with azotobactor/rhizobium, Deep ploughing during *kharif* season, Shallow irrigation of 4-5 cm depth, Sowing of vegetable seeds in polythene bags and replanting them in holes, Weed free environment	Seeds from State, national and private seed agencies seed agencies, The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler and drip irrigation systems, on laser land leveling
		Pearlmillet/-Wheat	Pearlmillet-Raya/Chickpea	• Paired row planting, Sprinkler irrigation. Planting on beds • Straw mulching, Laser land leveling, Split application of fertilizer, Straw mulching, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars, seed treatment with azotobactor/rhizobium, Deep ploughing during *kharif* season, Shallow irrigation of 4-5 cm depth • Weed free environment	
		Cotton-Wheat	No change	• Drip/furrow irrigation in cotton, paired row planting • Planting on beds, Straw mulching in cotton, Laser land leveling,	

				Split application of fertilizer, • Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars • Weed free environment	
		Pearlmillet/Fallow-Raya	Vegetables	Seed treatment with Azotobactor, Deep ploughing during kharif season, Shallow irrigation of 4-5 cm depth, Sowing of vegetable seeds in polythene bags and replanting them in holes.	
	Clay soils, canal irrigated	Rice-Wheat	Summer Moong-Rice	Sprinkler irrigation in moong, Planting on beds Laser land leveling Late sown cultivars,Short duration Desi wheat and Basmati rice.	Seeds from State and national seed agencies, The schemes of NREGS, RKRY, NFSM, NHM are in operation. Seed from private seed agencies
		Cotton-Wheat	None	Drip/furrow irrigation in cotton, paired row planting, Planting on beds, Straw mulching in cotton, Laser land leveling Split application of fertilizer, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars, Weed free environment	
		Sorghum fodder-wheat	Vegetables/ flowers	Sprinkler/drip irrigation, Planting on beds, laser land leveling, Mulching in inter-row spacing Limited ground water use, prefer life saving irrigation	

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Non release of water in canals under delayed onset of monsoon in catchment	Sandy soils, canal tubewell irrigated	Pearlmillet-Raya	Pulses-Raya	• Planting on beds Sprinkler irrigation, Marginal ground waters for life saving irrigation, Laser land leveling • Straw mulching, Paired row planting, • Split application of fertilizer, Straw mulching, • Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, • Short duration cultivars • Seed treatment with azotobactor/rhizobium, Deep ploughing during *kharif* season, Shallow irrigation of 4-5 cm depth, • Weed free environment	Seeds from State, national and private seed agencies seed agencies, The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler and drip irrigation systems, on laser land leveling
		Pearlmillet-	Clusterbean-Barley	-do-	

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
		Chickpea			
		Fallow – Raya/Barley	Vegetables-Raya	-do- Sowing of vegetable seeds in polythene bags and replanting them in holes. Drip irrigation in vegetables	
	Well drained, medium alluvial soils, canal irrigated	Clusterbean-Barley	Cotton-Wheat	Drip/furrow irrigation in cotton, Sprinkler in wheat, Planting on beds, Laser land leveling, Limited ground water use, prefer life saving irrigation, Conjunctive use of ground water Shallow irrigation of 4-5 cm depth, Weed free environment	
		Pearlmillet/fallow-Wheat	Pearlmillet-Raya/Chickpea	• Paired row planting, Sprinkler irrigation, Planting on beds • Straw mulching, Laser land leveling, Split application of fertilize, Straw mulching, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars, Seed treatment with azotobactor/rhizobium, Deep ploughing during kharif season, Shallow irrigation of 4-5 cm depth • Weed free environment. Short duration cultivars of crops • Conservation of rain water, mulching, rain water harvesting.	
		Pearlmillet/fallow-Raya	Sugarcane+Moong intercropping	• Drip/furrow irrigation in sugarcane, paired row planting • Planting on beds, Straw mulching in sugarcane, • Laser land leveling, • Split application of fertilizer, • Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars • Weed free environment.	
		Cotton-Wheat	No change	-do-	
	Clay soils, canal irrigated	Cotton-Wheat	No change	-do-	Seeds from State, national and private seed agencies seed agencies, The schemes of NREGS,
		Fallow --Raya	Sugarcane-Mungbean intercropping	-do-	

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
		Sorghum fodder-Wheat	Vegetables/ flowers	• Sowing of vegetable seeds in polythene bags and replanting them in holes. • Drip irrigation in vegetables, Planting on beds • Straw mulching, Laser land leveling, Split application of fertilizer, Limited ground water use, prefer life saving irrigation • Conjunctive use of brackish ground waters with canal waters, • Seed treatment with azotobactor /rhizobium • Weed free environment.	RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler and drip irrigation systems, on laser land leveling

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	Sandy soils, canal/ tubewell irrigated	Pearlmillet-Wheat	Clusterbean-Wheat	Planting on beds, sprinkler irrigation/drip irrigation Limited ground water use, prefer life saving irrigation	Short duration cultivars of crops, Shallow ground water use alone or in combination, Conservation of rain water, mulching, and rain water harvesting,
		Sorghum-Wheat	Sugarcane-Wheat/Raya		
		Pearlmillet-Chickpea	Fallow-Raya		
	Well drained, medium alluvial soils, canal/ tubewell irrigated	Rice-Wheat	Pearlmillet-Chickpea	Drip/furrow irrigation in cotton, sprinkler in wheat, planting on beds, Sprinkler irrigation, Planting on beds, planting with ridger seeder, laser land leveling Limited ground water use, prefer life saving irrigation	As above
		Cotton-Wheat	None		
		Rice- Berseem (fodder)	Cotton-Wheat		
	Clay soils, canal/ tubewell irrigated	Pigeon pea – Wheat/Barley	Summer Moong-Wheat	Drip irrigation, paired row planting of cotton, Planting on beds, Shallow irrigation in vegetable and straw mulching, Conjunctive use of ground water, Use of gypsum for reclaiming sodic waters, Limited ground water use, prefer life saving irrigation	As above
		Cotton-wheat	None		
		Sorghum fodder-Wheat	Vegetables/ Flowers		

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measure**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall	Sandy soils, tubewell irrigated	Pearlmillet-Barley	Clusterbean-wheat	Adoption of efficient methods of irrigation viz., drip in wide spaced, vegetables and horticultural crops Sprinkler irrigation in other crops	Seeds from State, national and private seed agencies seed agencies, The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler and drip irrigation systems, on laser land leveling
		Fallow-Raya (Mustard)	Sugarcane-wheat/Raya		
		Pearlmillet-Chickpea	Fallow-Raya (Mustard)		
	Well drained, medium alluvial soils, tubewell irrigated	Rice-Wheat	Pearlmillet-Chickpea		
		Cotton-Wheat	Pigeonpea-Wheat		
		Rice-Berseem(fodder)	Cotton-Wheat		
	Clay soils, tubewell irrigated	Pigeonpea –Wheat/Barley	Clusterbean-Raya		
		Pearlmillet–Raya/Chickpea	Planting on beds		
		Sorghum fodder-Wheat	Cucurbits-Raya		

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 the produce to dry place
Cotton	Drainage	-do-	-do-	-do-
Pearlmillet	-do-	-do-	-do-	-do-
Sorghum (fodder)	-do-	-do-	-do-	-do-
Horticulture				

All crops	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	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.	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
Cotton	-do-	-do-	-do-	-do-
Pearlmillet	-do-	-do-	-do-	-do-
Sorghum (fodder)	-do-	-do-	-do-	-do-
Horticulture				
All crops	• No adverse effect • Removal of unwanted sprouts • Spray insecticides & pesticides to control the insect & pest • Drain out water if heavy rains	• Drain out the excess water to avoid flower and fruit drop • To control the fruit drop apply foliar application of nutrients and growth regulators • Apply insecticide & pesticides to control the insect & pest and diseases on young developing fruits • Plough the field to increase the root aeration.	Harvest the fruits and send to the market immediately.	• Apply fungicide to avoid post harvest diseases. • Proper covering of the produce. • Proper grading and cleaning of fruits immediately after harvest. • Use the damaged fruits for processing • 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			
Bajra	Downy mildew incidence increases, There is no control measure except resistant varieties			
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.		
Cotton	Bacterial leaf blight increases due to rainfall from traces to moderate intensity whereas cotton leaf curl virus decreases Soak 5 -6 kg delinted and linted 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..			
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**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Rice	Surface drainage	Drainage	Drainage	Shifting the produce to dry place
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
Continuous submergence for more than 2 days				
Rice	Surface drainage	Drainage	Drainage	Shifting the produce to dry place
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	

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Pearlmillet	Micro-sprinkler irrigation, avoid irrigation during hot hours with poor quality waters	Micro- sprinkler irrigation, avoid irrigation during hot hours with poor quality waters	Micro-irrigation, avoid irrigation during hot hours with poor quality waters	
Sorghum	-do-	-do-	-do-	
Clusterbean	-do-	-do-	-do-	
Pigeonpea	-do-	-do-	-do-	
Horticulture				
All crops	Micro-irrigation, avoid irrigation during hot hours with poor quality waters	Micro irrigation, avoid irrigation during hot hours with poor quality waters	Micro irrigation, avoid irrigation during hot hours with poor quality waters	
Cold wave				
Wheat	Irrigation, balanced fertilizer application, Foliar spray of nutrients	Irrigation, fertilizer application	Irrigation, fertilizer application	
Raya	-do-	-do-	-do-	
Chickpea	-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			
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	• Apply light irrigation frequently • Creating smoke in the orchard during late evening. • Thatching of young plants during severe cold months. • Use of sprinkler irrigation. • Use of mulching under plant canopy			
Hailstorm				
Crop1				
Horticulture	• Plantation of wind breaks			

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
	• Use of hailstorm nets • Supplementation of nutrients to the trees			
Cyclone	NA			
Horticulture				
All crops	Seedling covers should be used			

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 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	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. 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,	1. Immediate efforts are needed to grow short duration fodder crops like oats, barley, *kasni* and *lucern* 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.

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
	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, bailing, densification and fortification is available with Punjab Agro Federation and in the market.	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	Prior to the onset of summer all the water ponds/lakes in the villages/cities should be filled up with canal water/tube wells.	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	Constitution of task force at district and sub division level which will formulate guidelines for action should have a mobile veterinary unit at their disposal. Procurement of mineral and feed supplements, life saving drugs,	Disbursement of supplements, treatment of affected animals in camps, proper disposal of dead animals, deworming and vaccinations.	Rehabilitation of affected animals, provision of veterinary aid and follow up, provide supplements etc to make up losses for deficiencies.

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
	electrolytes, vaccines etc.		
Floods			
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 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 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 livestockare trained regarding shifting of animals before flooding. The farmers are instructed to let loose their animals instead of tieing much before flood. 5. Increase the sown area under fodder crops 6. Looking to scarcity of crop residues,	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, *kasni* and *lucern* 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.	1. Immediate efforts are needed to grow fodder crops like oats, barley, *kasni* and *lucern* 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.

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
	burning of paddy straw and stubbles should not be allowed in Haryana. This can be properly harvested, bailed, 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.		
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	Constitution of task force at district and sub division level which will formulate guidelines for action. Procurement of mineral and feed supplements, life saving drugs, electrolytes, vaccines etc. Workout places for evacuation.	Evacuate to safe places, provide veterinary aid to affected animals, proper disposal of dead animals, disainfection of drinking water. If not already done, carry out deworming and vaccinations for HS, FMD, BQ in cattle, PPR, sheep pox, ET in sheep and goats, swine fever in pigs..	Rehabilitation of affected animals, provision of veterinary aid and follow up, provide supplements etc. Disinfection of area, control of vectors, prevention of spread of disease/outbreaks. Treatment of affected animals.
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	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	Normal shelter should be restored

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
		during heat period. 2. High energy and readily available sources of energy nutrients may be provided in the ration.	
Health and disease management	Provision of shelter/roof/covered and open area to animals, procurement of life saving drugs and vaccines.	Cold waves: Cover the animal with old blanket/gunny bag etc. Heat wave: Sprinkle water/take buffaloes to ponds. Treat affected animals, vaccinate if not done earlier.	Treatment of affected animals, provide veterinary aid and follow up.

[s] based on forewarning wherever available

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. I. The district authorities of Animal Husbandry Department should chalk out a complete programme to cater to feed the poultry birds.	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
Drinking water	Necessary arrangement for water storage should be made. Hand pumps should be installed around the sheds. Sufficient quantity	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	Normal drinking water restored

	of electrolytes should be ensured.	concerned Government functionaries of the Districts.	
Health and disease management	Constitution of task force at district and sub division level which will formulate guidelines for action should have a mobile veterinary unit at their disposal. Commercial poultry farms can procure grain/feed in advance.	In backyard birds, put some grains and sufficient water inside the enclosure, provide some vitamin supplement.	In backyard poultry, carry out de-worming and vaccination for Ranikhet disease and Gumboro. Provide vitamins and mineral supplement.
Floods			
Shortage of feed ingredients	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. 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.	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	Constitution of task force at district and sub division level which will formulate guidelines for action should have a mobile veterinary unit at their disposal. Make provision of	Evacuate the birds to safer places. Carry out deworming and vaccinations. May dispose off/sell birds for meat purpose. Proper disposal of dead birds.	Make shed dry, sprinkle lime & spray insecticides, disinfectant before placement of birds, use of coccidiostat in feed or water, proper disposal of dead

	shelter for evacuation and arrangement around farm so that flood water does not enter poultry farm/shed. Provision or facilities for disposal of dead birds.		birds.
Cyclone	-NA-		
Shortage of feed ingredients			
Drinking water			
Health and disease management	Keep arrangements in place in shed for heating during winter/cold waves and for cooling by use of sprinklers/foggers. Procure electrolytes and supplements.	Avoid too much fluctuation below the temperature of 70 ºF and above 100 ºF. Use bukharies, gas burner, secure curtains during winter. Provide a course of antibiotics in feed or water for 3-5 days to combat respiratory problems. Provide vitamin C, electrolyte in drinking water during heat waves and use of foggers, wetting of curtains, sprinkling of water etc. during heat waves. May dispose off/sell birds if heavy mortality occurring.	Treatment of affected birds, vaccination if delayed may be carried out as per schedule.
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	Window of sheds should be covered with gunny bags, tatties, & tirpal. Electric fans should be provided in the sheds and if possible desert cooler should be provided during heat period. High energy & readily available sources of energy nutrients may be provided in 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, aerators, huts etc)	Make alternate arrangements according to the anticipated conditions	Proper maintenance/repairing of damaged infrastructure or make new arrangements.	Proper maintenance/repairing of 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 KmNO4 @ 10 ppm. Sale out the bigger fishes.	Treatment of KmNO4 @ 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 1

Location map of district in the state of Haryana

Annexure 2

Mean Annual rainfall