State: PUNJAB

Agriculture Contingency Plan for District: BATHINDA

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Rajasthan Bagar, North Gujarat plain and South Western Punjab plain, hot typic arid eco-subregion (2.3)		
	Agro-Climatic Region (Planning Commission)	Trans-Gangetic Plain Region (VI)		
	Agro Climatic Zone (NARP)	Western Zone (PB-5)		
	List all the districts falling under the NARP zone (50% area falling in the Zone)	Faridkot, Bathinda, Ferozepur, Mansa, Musktsar.		
	Geographic coordinates of district headquarter	**Latitude**	**Longitude**	**Altitude**
		$30^0$12' 10.82" N	74^0 56' 21.22" E	226 m
	Name and address of concerned ZRS/ZARS/RARS/RRS/RRTTS	Regional Station, Punjab Agricultural University, Bathinda-151001 (Punjab)		
	Mention the KVK located in the district with address	KVK, Dabwali Road, Bathinda-151001 (Punjab)		
	Name and address of the nearest Agromet Field unit (AMFU,IMD) for agro-advisories in the zone	AMFU, Regional Station, Bathinda -151001 (Punjab)		

1.2	Rainfall (Jan. – Dec. 2009)	Normal Rainfall (mm)	Rainy days	Average (mm)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	335.4	15	14.6	29th June in parts and 1st week of July in remaining parts	After 2nd week of September
	NE Monsoon(Oct-Dec):	29.3	1	1.3	-	-
	Winter (Jan- March)	42.1	3	3.5		
	Summer (Apr-May)	17.1	4	1.4		
	Annual:	423.9	23	20.8		

1.3	Land use pattern of the district	Total geographical area	Cultivable area	Forests area	Land under non-agricultural use	Permanent pastures	Cultivable waste land	Land under misc. tree crops and groves	Barren and cultivable land	Current fallow	Other fellows
	Area ('000 ha)	337	297	8	32	-	-	-	-	-	-

1. 4	Major Soil types	Area ('000 ha)	% Area
	Sandy(s) soils	0.65	19.5
	Loamy sand (ls) soils	1.33	39.8
	Sandy loam (sl) soils	1.36	40.7

1.5	Agricultural Land Use	Area ('000 ha.)	Cropping Intensity
	Net sown area	297	187%
	Area sown more than once	258	
	Gross sown area	555	

1.6	**Irrigation**	**Area ('000 ha)**		
	Net irrigated area	295		
	Gross irrigated area	552		
	Rainfed	-		
	Sources of irrigation		**Area ('000 ha)**	**Percentage of irrigated area**
	Canal (35% area is canal irrigated)	-	215	72.8
	Tanks	-	-	-
	Open wells	-	-	-
	Bore wells	34896.	80.0	27.2
	Lift irrigation schemes	-	-	-
	Micro-irrigation	-	-	-
	Other sources	-	-	-
	Total irrigated area		295.0	100
	Pump sets		34896	
	Tractors		22500	
	Ground water availability and use	**Number of blocks**	**% Area**	**Quality of water**
	Over exploited	4	81	
	Critical	1	14	
	Semi critical	-	-	
	Safe	2	5	
	Waste water availability and use	-	-	
	Ground water quality	Mostly unfit for irrigation purpose in four blocks		High content of fluorides in addition to salinity in irrigation water

1.7 Area under major field crops & horticulture (2008-09)

		Area (000ha)							
1.7	**Area under major field crops (000ha)**	**Kharif**			**Rabi**			**Summer**	**Total**
	Crop	**Irrigated**	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**		
	Cotton	165		165					165
	Rice	86		86					86
	Wheat				245		245		245
	Rape seed & Mustard				6		6		6
	others	1		1	2		2		3

Horticulture crops		**Area ('000 ha)**	**Production (‘000 t)**
	Fruits	**Total**	
	Citrus	2.736	57.935
	Orange and malta	0.097	0.563
	Lemon	0.002	0.008
	Mango	-	
	Litchi	-	
	Guava	0.484	9.377
	Pear	0.016	0.367
	Peach	0.060	1.084
	Grapes	0.487	8.177
	Ber	0.379	6.182
	Misc.	0.430	
	TOTAL	**4.304**	

Vegetable crops		Area ('000 ha)		
		Total		
	Potato	6.460		
	Cucurbits	0.345		
	Chilli	0.325		
	Onion	0.270		
	Root crops	0.285		
	Others (Tomato,brinjal,okra etc.)	0.780		
	Sericulture	NA		
	Medicinal and Aromatic crops	NA		
	Plantation crops	NA		
	Grazing lands (ha)	--------		
	Fodder crops (2007-08)	**Area (' ha)**		
		Total	**Irrigated**	**Rainfed**
	Jowar	1730	1730	-
	Bajra	1905	1905	-
	Mak Chari	595	595	-
	Berseem	7020	7020	-
	Oats	5185	5185	-

1.8	**Livestock (in number)**	**Male (‘000)**	**Female (‘000)**	**Total (‘000)**
	Non descriptive Cattle (local low yielding)	25.0	25.9	51.0
	Crossbred cattle	11.4	42.9	54.4
	Non descriptive Buffaloes (local low yielding)	0.4	3.5	4.0
	Graded Buffaloes	33.3	236.5	269.9
	Goat	8.5	30.7	39.3
	Sheep	6.7	23.0	29.7
	Others Equine (Horse &Pony)	0.6	1.3	2.0
	Commercial dairy farms (Number)			0.02

1.9	**Poultry**	**No. of farms**	**Total No. of birds (‘000)**
	Commercial	33	206.7
	Backyard	-	40.7

1.10 Fisheries (Data source: Chief Planning Officer of district)

A. Capture

i) Marine (Data Source: Fisheries Department)	**No. of fishermen**	**Boats**		**Nets**		**Storage facilities (Ice plants etc.)**
		Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	

ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**	**No. of Reservoirs**	**No. of village tanks**
	34	**-**	**568**

B. Culture

	Water Spread Area (ha)	**Yield (t/ha)**	**Production (‘000 tons)**

	i) Brackish water (Data Source: MPEDA/ Fisheries Department)	785.2	5.67	4.4520
	ii) Fresh water (Data Source: Fisheries Department)			

1.11 Production and productivity of major crops (2008-09)

1.11	**Name of crop**	**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)**
	Cotton	692*	756	-	-	-	-	692*	756
	Rice	384	4261	-	-	-	-	384	4261
	Wheat	-	-	1025	4183	-	-	1025	4183
	oilseed			8	1230			8	1230
	Barley			7	3333			7	3333
	Pulses	8	770					8	770
* refers to 000 bales									

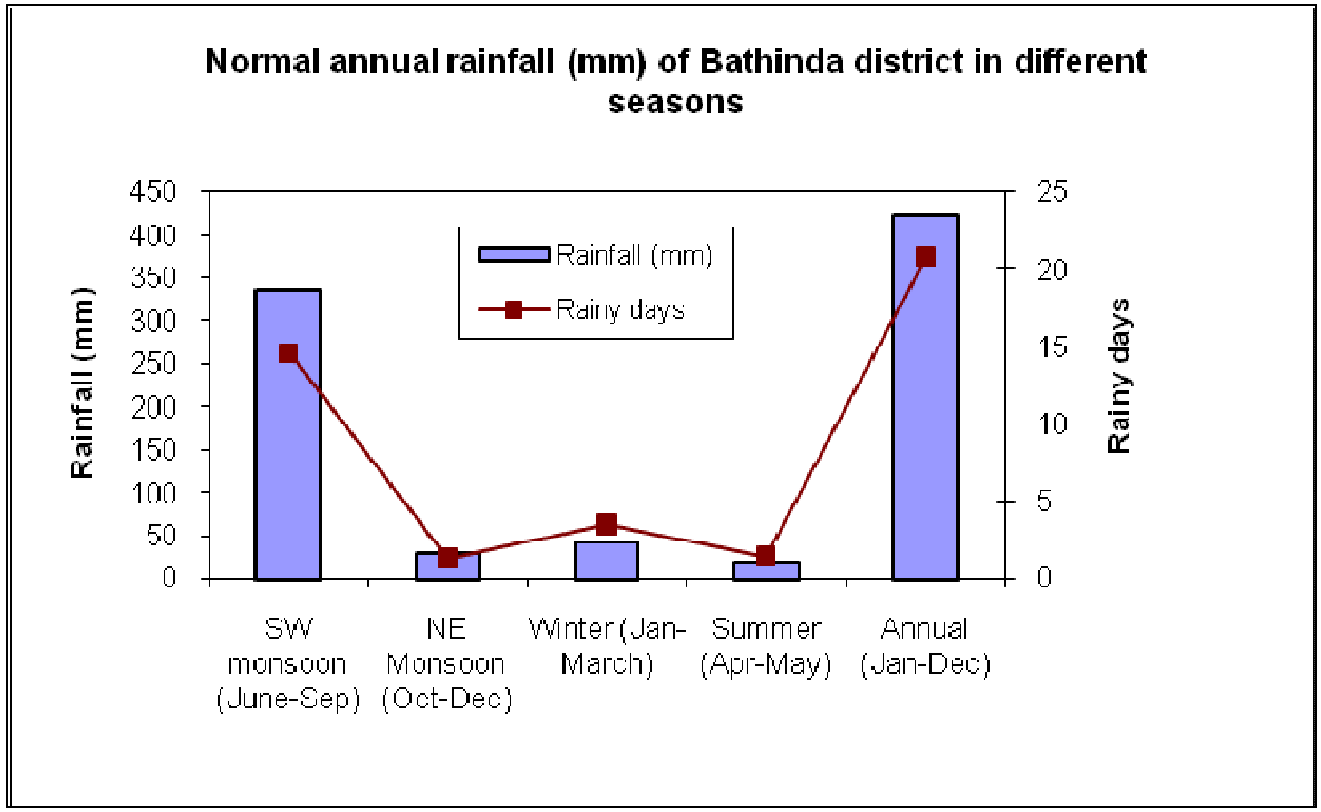
1.12	**Sowing window**	**Cotton**	**Rice**	**Wheat**	**Oilseed**
	Kharif-rainfed	-	-	-	-
	Kharif-irrigated	First April to 15th of May	Paddy (15th of May to 15th of June)		
	Rabi-rainfed				
	Rabi-irrigated			Wheat (Last week of October to Last week of November	• October-March Rapeseed and Mustard • Taramira (whole

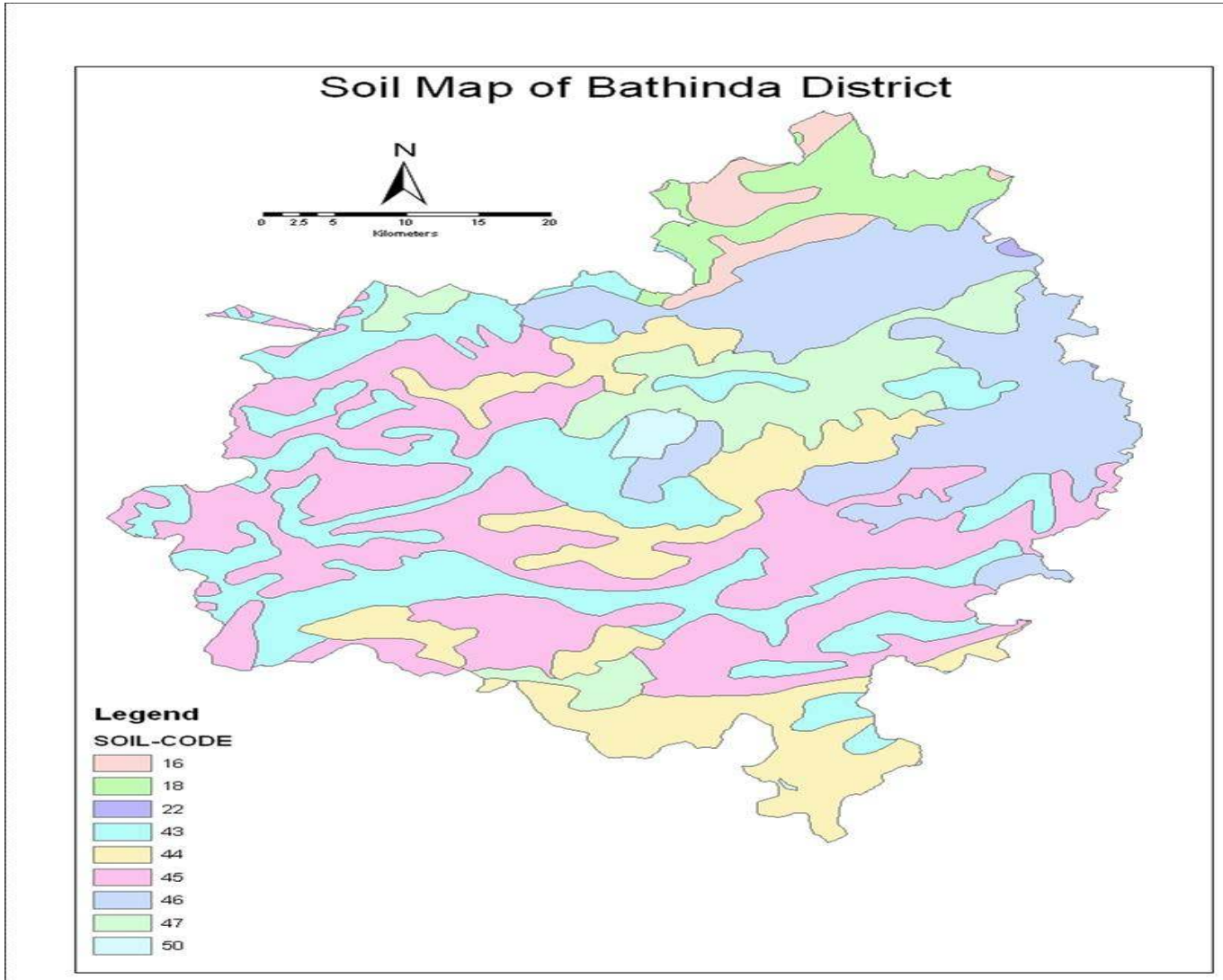
					October), • Raya (mid October to mid November), • Toria (First fortnight of September), • Gobhi Sarson (October10 to October 20)

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasssional	None
	Drought			√
	Flood			√
	Cyclone			√
	Hail storm		√	
	Heat wave	√		
	Cold wave		√	
	Frost		√	
	Sea water inundation			√
	Pests and diseases	√		

1.14	Include Digital maps of the district for	Location map of district with in State as Annexure I	YES
		Mean annual rainfall as Annexure 2	YES
		Soil map as Annexure 3	YES

LOCATION OF BATHINDA


Normal annual rainfall (mm) of Bathinda district in different seasons
Rainfall (mm)
Rainy days
450
400
350
300
250
200
150
100
50
0
25
20
15
10
5
0
Rainfall (mm)
Rainy days
SW monsoon (June-Sep)
NE Monsoon (Oct-Dec)
Winter (Jan-March)
Summer (Apr-May)
Annual (Jan-Dec)


Soil Map of Bathinda District
N
0 2.5 5 10 15 20
Kilometers
Legend
SOIL-CODE
16
18
22
43
44
45
46
47
50

2.0 Strategies for weather related contingencies

2.1 Drought:

2.1.1 Rainfed situation: Not applicable

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	Not applicable				
Delay by 4 weeks					
Delay by 6 weeks					
Delay by 8 weeks					

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measues**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.					
Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measues**	**Remarks on Implementation**
At vegetative stage					

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measues**	**Remarks on Implementation**
At flowering/ fruiting stage					
Condition			**Suggested Contingency measures**		
Terminal drought	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measues**	**Remarks on Implementation**
(Early withdrawal of monsoon)					

2.1.2 Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed/ limited release of water in canals due to low rainfall	Canal / Tubewell irrigated Alluvial soils	Cotton - Wheat	Prefer short duration maize varieties like PMH2 and JH -3459 can be grown		
		Rice - Wheat	Gram (PDG 4 and PDG 3)	Deep tillage should be done up to 22.5 cm found to be increase the yield Mix poor quality water	
			Wheat	Grow late sown varieties PBW 590, PBW 509, PBW 373. Bi-directional sowing increases the yield of 2q/ acre. Bed planting increases the yield about 3-4% closed spacing (7.5 x 22.5 cms) Seed priming	

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Limited release of water in canals under delayed onset of monsoon in catchment	Cotton - Wheat	Cotton should be replaced with Short duration maize varieties like PMH2 and JH -3459 can be grown			

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	Not Applicable				

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	Not Applicable				

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 rainfall	Not Applicable				

2.2 Un-timely (unseasonal) rains

Condition	**Suggested contingency measure**			
Heavy rainfall with high speed winds in a short span	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Cotton	Ridge planting, pumping out excess rain water	Pumping out excess rain water, application of nitrogenous fertilizer, Foliar spay of 2 % KNO_3	Pumping out excess rain water and chemical control of pests/ diseases	Storage of produce at safer place
Rice	Pumping out excess rain water, Nitrogenous fertilizer application	Pumping out excess rain water.	Pumping out excess rain water	Shifting of produce at safer place for drying.
Wheat	Bed/ bidirectional sowing increases the yield about 3-4% (specify the details), Pumping out excess rain water, apply Nitrogenous fertilizer and Gypsum(100 kg/acre) to check nitrogen & sulphur Deficiency respectively	Pumping out excess rain water, foliar spray of 3%urea solution	Pumping out excess rain water	Shifting of produce at safer place for drying
Horticulture				
Citrus	Cultivation on well drained soils, drainage of excess water, raising of soil surface around the tree trunks, chemical control of foot rot (Give 3 sprays of 50g streptocyclin + 25 g copper sulphate in 500 L of water one each in October, December and Feburary)/ phytophthora, remove	Drain out excess rain water and prune out broken branches	Drain out excess water, Application of growth regulators to check fruit drop due to water-imbalance	Drain out excess water

	broken branches			
Grapes	Drainage of excess water, chemical control Prune the shoots in Jan and Feb, Spray Bordeaux mixture in last week of March, Spray Bavistan 50 WP @ 500g in last week of May in 500 L of water , Spray Bavistan 50 WP @ 500g in mid July in 500 L of water, of anthracnose	Drain out excess rain water	Cultivation of early ripening cultivars and application of Israeli technique for quality improvement	Shifting and storage of rainy season harvested fruits at proper place.
Guava	Drainage of excess water, raising of soil surface around the tree trunks	Drain out excess rain water		Shifting and storage of harvested fruits at proper place
Chilli	Re sowing	Wilting and lodging. Pumping of access rain water and spray the crop with M -45 or Blitox @ 3 gm per litter water		-
Cucurbits	-	Rottening of flowers and fruit, Spray M-45@ 3gm per litter water		-
Outbreak of pests and diseases due to unseasonal rains				
Cotton	Spray Larwin@250g Or Ekalux 800ml/acre to check Mealy bug	**1. Insect/Pests:** Spray Imedachloprid 40 ml/ Pride20ml/acre for Jassid; Hostathion 600 ml/acreagainst white fly; Larwin@250gOr Ekalux 800ml/acre to check Mealy bug; synthetic pyrethroids / Carbamate insecticides against Pink/ spotted /American(small size) boll worm ; Organophosphate/Naturalite/oxaddiazine against American(big size) boll worm and Carbamate/ Organochlorinate/ Organophosphates against Tobacco boll worm. **2. Diseases:** grow LH 144/LH 2076 against Leaf curl;; Cobalt chloride($COCl_2$) to check para wilt disease,Spray blitox + streptocycline against Bacterial Blight and Blitox/ Captan for control of Anthrcnose, leaf blightand leaf spot .		Storage of produce in dry place
Rice	Spray Nuvacron/Monocil@ 560 ml/acre against leaf folder and stem borer.	**1. Insect/Pests**:Spray Nuvacron/Monocil@ 560 ml/acreagainst leaf folder and stem borer; Confidor @40 ml/acre/ Ekalux @ 800 ml/acre against Plant hoppers/ Rice ear cutting caterpillar. **2. Diseases**: Grow PR 120, PR 111 against Bacterial leaf blight		Storage of produce in dry place

		(BLB); spray Blitox (500ml)/Tilt (200ml) per acre to control False smut;Spray Tilt @ 200ml/acre against sheath blight ,Sheath rot and Bunt diseases.		
Wheat	Spray pesticide to control pink boll worm especially in rice fields.	Spray Nuvacron @150ml/acre to control sucking pest (Aphid)	Spray Nuvacron @150ml/acre to control Aphid, Ekalux for Army worm (@400 ml); Bollworm (800 ml) per acre and Tilt @200ml/acre to check Karnal bunt & rusts.	Treat the produce meant for seed with 250gmMalathion dust (5%) and disinfest 10gunny bags with 5 ml cymbush/10 litres water, Godowns with 100 ml ythion/10 litres water.
Horticulture				
Citrus	Chemical control of phytophthora / foot rot with Ridomil-MZ/ Alliette as per recommendation, Control of sucking pests with systemic pesticides	Chemical control of phytophthora / foot rot with Ridomil-MZ/ Alliette as per recommendation, Control of sucking pests with systemic pesticides	Chemical control of phytophthora / foot rot with Ridomil-MZ/ Alliette as per recommendation, Control of sucking pests with systemic pesticides	Application of fungicides/ nutrients to check post harvest losses
Guava	Chemical control of sucking pests and diseases like powdery mildew/ anthracnose	Chemical control of sucking pests and diseases like powdery mildew/ anthracnose	Chemical control of sucking pests and diseases like powdery mildew/ anthracnose/ hen and chicken disease/shot berry etc.	Timely harvesting of grapes, storage in proper CFB boxes.
Grapes	Chemical control of sucking pests	Chemical control of sucking pests and diseases like anthracnose.	Chemical control of fruit fly and anthracnose of guava. Harvesting at proper maturity level.	Storage at proper place
Chilli	-	Pumping out of excess rain water to check wilt	Spray Blitox @ 5 g/ l water to check rottening of fruit	Keep in dry place
Cucurbits	-	Spray Indofil M 45 @ 3 g/l water against downy mildew	Spray Blitox @ 5 g/ l water to check rottening of fruit. Also destroy the infested fruits and spray the crop with Endosulfan @ 8 ml/l or Sevin @ 5 g/l water to control fruit fly	-

2.3 Floods: NA

Condition	Suggested contingency measure			
Heavy rainfall with high speed winds in a short span	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Not Applicable				

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave				
Cotton	Heavy rain (psi) with canal water, planting of crop on eastern side Of N-S ridge, gap filling and light irrigation	Apply light irrigation	NA	NA
Rice	Correct Iron deficiency with 0.5 per cent iron sulphate spray, light and frequent irrigation	Pounding of water for fifteen days after transplanting to check iron deficiency and for crop establishment	NA	NA
Wheat	NA	NA	Apply light irrigation	NA
Horticulture				
Citrus	Light and frequent irrigation and shelter from western side to check sun scald and burning injury, application of white wash pint on main stems,	Apply light and frequent irrigation to check Dropping of flowers and fruit with growth regulator like 2-4-D/GA.		NA
Cucurbit	Frequent irrigation and shelter from western side to check burning of crops	Apply frequent irrigation to check Drooping of flowers and drawing of pollens.		NA
Chilli	Mulching and frequent irrigation	Mulching and frequent irrigation	Mulching and frequent irrigation	NA
Horticulture				

Citrus	Apply light and frequent irrigation , protect the plants by providing shelter from North-West direction, smoking	Apply light and frequent irrigation , protect the plants by providing shelter from North-West direction, smoking		NA
Sweet pepper	Provide shelter with sarkanda or cover crop with polythene in low tunnel		-	-
Tomato	Provide shelter with sarkanda or cover crop with polythene in low tunnel		-	-
Frost				
Horticulture				
Citrus	New plantation, and cover the plants with grass or sarkanda etc	Installation of wind breaks, smoking etc.		NA
Potato	-	Apply light irrigation or use sprinkler irrigation mid night		-
Capsicum	Apply light irrigation or cover the crop with Ployteen, sarkanda.	-	-	-
Hailstorm				
Horticulture				
Citrus	Protection of nursery with sarkanda etc/ growing of nursery under protected structures.	Removal of broken limbs Apply light irrigation and sparys fungicide to check fungal infection with blitox, Bordeaux mixture etc.		NA
				-
Cucurbit	Re sowing or re transplanting	Apply light irrigation and sprays fungicide	Apply light irrigation and sprays fungicide	
Tomato	Re sowing or re transplanting	Apply light irrigation and sprays fungicide	Apply light irrigation and sprays fungicide	-

2.5 Contingent strategies for Livestock, Poultry & Fisheries for District: BATHINDA

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought	**Not applicable**		
Floods	**Not applicable**		
Cyclone	**Not applicable**		
Cold wave	Covering all the wire meshed walls / open area with gunny bags/ polyethylene sheets (with a mechanism for lifting during the day time and putting down during night time)	Allow for late grazing between 10AM to 3PM during cold waves Add 25-50 ml of edible oil in concentrates and fed to the animal during cold waves In severe cases, put on the heaters at night times Apply / sprinkle lime powder in the animal shed during cold waves to neutralize ammonia accumulation	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)
Heat wave	Arrangement for protection from **heat wave** i) Plantation around the shed ii) H_2O sprinklers / foggers in the shed **iii)** Application of white reflector paint on the roof **iv)** Thatched sheds should be provided as a shelter to animal to minimize heat stress	Allow the animals early in the morning or late in the evening for grazing during heat waves Feed green fodder (maize or perennial fodder)/silage / concentrates/complete feed or feed blocks during day time and roughages / hay during night time in case of heat waves Put on the foggers / sprinkerlers/fans during heat weaves in case of high yielders (Jersey/HF crosses) In severe cases, vitamin 'C' and electrolytes should be added in H_2O during heat waves.	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	Submission for insurance claim and availing insurance benefit Purchase of new productive animals

2.5.2 Poultry

	Suggested contingency measures			Convergence/ linkages with ongoing programs, if any
	Before the event	**During the event**	**After the event**	
Drought	**Not applicable**			
Floods	**Not applicable**			
Cyclone	**Not applicable**			
Heat wave and cold wave				
Shelter/environment management	***Heat wave:*** Provision of proper shelter with good ventilation	In severe cases, foggers/water sprinklers/wetting of hanged gunny bags should be arranged Don't allow for scavenging during mid day	Routine practices are followed	
	Cold wave: Provision of proper shelter Arrangement for brooding Assure supply of continuous electricity	Close all openings with polythene sheets In severe cases, arrange heaters Don't allow for scavenging during early morning and late evening	Routine practices are followed	
Health and disease management	Deworming and vaccination against RD and fowl pox	Supplementation of house hold grain Provide cool and clean drinking water with electrolytes and vit. C In hot summer, add anti-stress probiotics in drinking water or feed	Routine practices are followed	

2.5.3. Fisheries/ Aquaculture

	Suggested Contingency measures		
	Before the event	**During the event**	**After the event**
1. Drought			
A. Capture			
Marine	-	-	-
Inland			
(i) Shallow water depth due to insufficient rains/inflow	I) Critical analysis of long range forecast data. ii) Storage of water. iii) Afforestation program. iv) Conservation of rivers/reservoir/ponds. v) Re-excavation of local canals and reservoirs.	i) Use stored water. ii) Use surface water flow. iii) Divert water from unutilized areas. iv) Utilize canal water. v) Aeration of water in ponds/reservoirs.	i) Need based monitoring through research plan. ii) Intensive afforestation program. iii) Augmentation of surface water flow. iv) Strengthening of water reservoirs. v) Rain water harvesting . vi) Compensation claims. vii) Prepare vulnerability map and place it to management committee.
(ii) Changes in water quality	i) Prohibit dumping of solid, liquid and waste in water sources. ii) Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.	i) Use disinfectants and therapeutic drugs. ii) Adoption of bio-remedial measures	i)Need based research data should be generated on water quality. ii) Dumping of solid, liquid and waste in water bodies should be stopped through enactment of legislation.
(iii) Any other			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	) Critical analysis of long range	i) Use stored water.	i) Need based monitoring through research

	forecast data. ii) Storage of water. iii) Afforestation program. iv) Conservation of rivers/reservoir/ponds. v) Re-excavation of local canals and reservoirs.	ii) Use surface water flow. iii) Divert water from unutilized areas. iv) Utilize canal water. v) Aeration of ponds.	plan. ii) Intensive afforestation program. iii) Augmentation of surface water flow. iv) Construction of water reservoirs. v) Adoption of rain harvesting methods. vi) Compensation claims . vii) Prepare vulnerability map and place it to management committee.
(ii) Impact of salt load build up in ponds/Changes in water quality	i) Prohibit dumping of solid, liquid and waste in water sources. ii) Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.	i) Use disinfectants and therapeutic drugs. ii) Adoption of bio-remedial measures	i)Need based research data should be generated on water quality. ii) Dumping of solid, liquid and waste should be stopped through enactment of legislation.
(iii) Any other	-	-	-
2. Flood			
A. Capture			
Marine	-	-	-
Inland			
(i) Average compensation paid due to loss of human life	i) Be prepared to evacuate at a short notice. ii) Preparation of flood control action plan. iii) Warning dissemination and precautionary response. iv) Formation of flood management committee. v) Enhancement in coping capabilities of common people.	i) Human evacuation from the area. ii) Coordination of assistance. iii) Damage and need assessment. iv) Immediate management of relief supplies. v) Immediate help delivery.	i) Arrangement for rescue and casualty care. ii) Arrangement for burial control room. iii) Restoration of essential services, security and protection of property. iv) Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan. v) Insurance and compensation claim.

	vi) Insurance for the life of people/fishermen.		
(ii) No. of boats/nets damaged	i) Annual repair of boats/nets and gears. ii) Insurance of boats/nets/gears.	i) Coordination of assistance iii) Immediate management of relief supplies. iv) Govt. support and compensation.	i) Education and training for the repair of boats/nets and gears. ii) Loss assessment & insurance claim.
(iii) No. of houses damaged	i) Education and training for the repair of houses. ii) Store raw material for emergency repair of houses. iii) House insurance.	i) Arrangement of temporary shelters for homeless people. i) Damaged house enumeration and need assessment. ii)Coordination of assistance. iii) Immediate management of relief supplies.	i)Loss assessment & insurance claim. ii) Govt. assistance claim.
(iv) Loss of stock	i) Keep boats, nets/gears ready for emergency use. ii) Store fuels, food/other item iii) Develop flood control management plans. iv) Stock material insurance.	i) Search/locate the stock/input. ii) Mobilize local people for protection. iii) Hire stock/inputs from distant areas/company/ farmers who are not affected by flood.	i) Locate backup stocks and verify its usability time. ii) Follow flood control management plan. iii) Notify utilities of the critical demand about loss of stock and inputs. iv) Loss assessment & insurance claim.
(v) Changes in water quality	i) Provision to stop/close the effluent/sewerage discharge point in water bodies ii) Store chemicals, disinfectants and therapeutic drugs. iii) Develop flood control management plan.	i) Do not use contaminated water ii) Proper preparation and management through emergency aeration. iii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. iv) Immediate support of	i) Need based research data should be generated to maintain water quality, iii) Dumping of solid, liquid and waste should be stopped through enactment of legislation. iv) Contact Govt. and industrial organization for immediate remedy and cleaning of the

		Govt./industrial organizations for maintaining the purity and quality of water bodies. v) Need based bioremediation	water bodies. v) Regular water monitoring and bio-monitoring of water bodies for formulation of management plan
(vi) Health and disease	i) Advance planning and preparedness. ii) Store chemicals, disinfectants and therapeutic drugs. iii) Stock sufficient stores of medicines.	i) Prompt action or immediate removal of disease causing agents/ dead fish, followed by sterile or landfill disposal. ii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. iii) Emergency aeration or splashing in water bodies.	i) Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. iv) Eradicating the disease where possible. v) Follow up surveillance and monitoring after disease outbreak. vi) Bio-monitoring and maintaining water quality. vii) Need based research data should be generated. vii) Loss assessment & insurance claim.
B. Aquaculture			
(i) Inundation with flood water	i) Proper facility construction for ponds and its stock safety. ii) Development of flood control management plan. iii)Preparedness with emergency backup equipment on site. iv) Stock insurance. v) Preventive measures against entry of alien/wild organisms through flood water.	i) Arrangement for evacuation. ii) Arrangement for rescue and casualty care. iii) Arrangement for burial control room. iv) Restoration of essential services, security and protection of property. v) Coordination of assistance. vi) Damage and need assessment. vii) Immediate management of relief	i) Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan ii) Reallocate fish to maintain appropriate biomass so that waste assimilation capacity of pond is not exceeded. iii) Reduce or cease feeding because uneaten food and fish waste decreases the dissolved oxygen level.

		supplies. viii) Release excess water from height of T. viii) Lower the water level in culture facilities.	iv) Strengthening of water bodies/ponds. v) Loss assessment & insurance claim.
(ii) Water contamination and changes in water quality	i) Store chemicals, disinfectants and therapeutic drugs ii) Develop flood control management plan	i) Do not use contaminated water. ii) Proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator), that may improve water quality in affected areas. iii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. iv) Maintaining the purity and quality of water bodies. iv) Need based bioremediation.	i) To maintain water quality, need based research data should be generated ii) Dumping of solid, liquid and waste should be stopped through enactment of legislation. iii) Immediate remedy and cleaning of water bodies. iv) Regular water monitoring and bio-monitoring of water bodies for formulation of management plan.
(iii) Health and diseases	i) Advance planning and preparedness. ii) Store chemicals, disinfectants and therapeutic drugs. iii) Stock sufficient emergency medicines.	i)Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish. ii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. iii) Determination of nature and speed of transmission of diseases.	i) Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. ii) Eradicating the disease. iii) Follow up surveillance and monitoring. iv) Proper disposal of dead fish. v) Loss assessment & insurance claim.

		vi)Emergency aeration or splashing in water bodies.	
(iv) Loss of stock and input (feed, chemicals)	i) Keep the stock/input at safe place for emergency purpose. ii) Store fuels, food/other item. iii) Develop flood control management plan. iv) Stock material insurance.	i) Search/locate the stock/input. ii) Purchase/hire valuable stock/inputs from distant areas not affected by flood.	i) Strengthening of stocks. ii) Assessment of total loss. iii) Insurance claims.
(v) Infrastructure damage (pumps, aerators, huts etc)	i) Educate and provide training for the repair of infrastructure. ii) Follow flood control management plan. iii) Store raw materials for repairing of pumps aerators, huts etc. iv) Infrastructure insurance.	i) Notify utilities of the critical demand. ii)Coordination of assistance. iii) Immediate management of relief supplies.	i)Damaged infrastructure enumeration and need assessment. ii) Locate backup equipment and verify its operation. iii) Repair of damaged infrastructure. iv) Loss assessment & insurance claim.
3. Cyclone / Tsunami	**Not a cyclone affected district.**		
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 (freshwater/brackish water ratio)	-	-	-
(iii) Health and disease	-	-	-
(iv) Loss of stock and input (feed, chemicals etc.)	-	-	-
(v) Infrastructure damage (pumps, aerators, shelters/huts etc.)	-	-	-
(vi) Any other	-	-	-
4. Heat wave and cold wave			
A. Capture			
Marine	-	-	-
Inland	i)Stay aware of upcoming temperature changes. ii) Arrange the aerators. iii) Ensure sufficient water level in water bodies. vi) Formulate strategic fishing management during the heat/ cold waves. v) Tree plantation around fish ponds	i) Monitor fishing sites frequently to ensure that they are not affected by heat or cold waves. ii) Use dark materials to cover the water bodies during excessive heat waves. iii) Stay hydrated by drinking plenty of fluids during fishing/field work. iv) Educating the farmers through electronic or print media	i) Intensive afforestation program for reducing heat waves. ii) Collect basic weather data and incidence of extreme and physical data of water bodies, water chemistry and seasonal changes, plankton profile and seasonal blooms, topography and soil composition. iii) Gather information about history of catch per unit effort as well as fish yield rate during heat wave and cold wave and accordingly simulate future plan for sustainable fishing. v) Loss assessment & insurance claim.
B. Aquaculture			
(i) Changes in pond environment (water quality)	i)Listen to local weather forecasts and stay	i) Monitor fishing sites frequently to	i) Intensive afforestation program for

	aware of upcoming temperature changes. ii) Arrange the aerators. iii) Ensure sufficient water quantity in water bodies. iv)Formulate strategic fishing management for the heat /cold waves. v) Tree plantation around fish ponds	ensure that they are not affected by heat or cold waves. ii) Use dark materials to cover the water bodies during excessive heat waves. iii) Stay hydrated by drinking plenty of fluids during fishing/field work. vi) Adopt proper care and management during the fishing period of cold/heat wave like keeping stock of drinking water and extra cloths. vi) Educating the farmers through electronic or print media	reducing heat waves. ii) Collect basic weather data and incidence of extreme and physical data of water bodies, water chemistry and seasonal changes, plankton profile and seasonal blooms, topography and soil composition. iii) Gather information about history of catch per unit effort as well as fish yield rate during heat wave and cold wave and accordingly simulate future plan for sustainable fishing. vi) Loss assessment & insurance claim.
(ii) Health and disease management	i) Advance planning and preparedness. ii) Store chemicals, disinfectants and therapeutic drugs. iii) Develop heat/ cold wave control management plan. iv) Stock sufficient emergency medicines.	i)Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish. ii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. iii) Determination of nature and speed of transmission of diseases. vi)Emergency aeration or splashing in water bodies	i) Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. ii) Eradicating the disease. iii) Follow up surveillance and monitoring. iv) Proper disposal of dead fish. v) Loss assessment & insurance claim.