State: Uttarakhand

Agriculture Contingency Plan for District: Udham Singh Nagar

1.0	**District Agriculture profile**			
1.1	**Agro-Climatic/ Ecological Zone**			
	Agro-Ecological Sub Region (ICAR)	Western Himalayas, Warm Subhumid (To Humid With Inclusion Of Perhumid) Eco-Region. (14.5)		
	Agro-Ecological Region (Planning Commission)	West Himalayan Region (I)		
	Agro-Climatic Zone (NARP)*	Hill zone (UP-1)		
	List all the districts falling under the NARP Zone	Haridwar, Nainital, Almora, Bageshwar, Champawat, Pithoragarh, Pauri, Tehari, Uttarkashi, Dehradun, Chamoli, Rudraprayag		
	Geographic coordinates of district	**Latitude**	**Longitude**	**Altitude**
		$28^0$43'N – $31^0$27'N	$77^0$34E - $81^0$02E	217m
	Name and address of the concerned ZRS/ZARS/ RARS/RRS/ RRTTS	Zonal Project Directorate, Zone IV, Indian Council of Agricultural Research, GT Road Rawatpur, Near Vikas Bhawan, Kanpur 208002, Ph: 0512-2533560, 2554746		
	Mention the KVK located in the district	Krishi Vigyan Kendra, Bajpur Road, Kashipur (Udham Singh Nagar) Phone: Dr. C. Tiwari (7500241505, 9412655395), Email: kvkkashipur@gmail.com		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	Dr H S Kushwaha, Professor, Agrometeorology, GBPUA&T, Pantnagar-263145 U S Nagar (UK) India		

1.2	**Rainfall**	**Average (mm)**	**Normal Onset**	**Normal Cessation**
	SW Monsoon (June-Sep)	3153	2rd week of July	2rd week of September
	NE Monsoon (Oct.-Dec)	80	2rd week of December	2rd week January
	Winter (Jan-Feb)	30		

	Summer (Mar.-May)	80		
	Annual	1433		

1.3	Land use pattern of the district *	Geographical/ Area	Cultivable area	Forest area	Land Under Non Agricultural Use	Permanent Pastures	Cultivable Wasteland	Land Under Misc. Tree Crops and Groves	Barren and Uncultivable Land	Current Fallows	Other Fallows
	Area ('000 ha)	286	149	100	2.9	3.0	0.03	0.09	0.19	0.2	30

1.4b	Major soils *	Area ('000ha)	Percent (%) of Total Area
	Udi fluventic Ustochrepts,	286	
	Typic Ustochrepts		
	Typic Ustipsamments		
	Udic Haplusstolls		
	Udic Ustochrepts		

1.5	Agricultural land use *	Area ('000ha)	Cropping intensity %
	Net sown area	149.0	212
	Area sown more than once	107.9	
	Net irrigated area	145.2	
	Gross cropped area	316.3	

* http://usnagar.nic.in/files/table-17.pdf

1.7 Area under major field crops (‘000 ha)

1.7	Major field crops	Area ('000 ha)	Irrigated	Rainfed
	Sugarcane	38.1		
	Paddy	108.0		
	Wheat	83.0		
	Maize	0.7		
	Pulses	3.7		
	Horticulture crops-fruits	**Area ('000 ha)**	**Irrigated**	**Rainfed**
	Mango	234		
	Litchi	640		
	Guava	432		
	Horticulture crops-vegetables	**Area ('000 ha)**	**Irrigated**	**Rainfed**
	Okra	393		
	Vegetable pea	1346		
	Potato	1832		
	Cauliflower	219		
	Onion	288		
	Cabbage	270		
	Medicinal and Aromatic Crops	**Area ('000 ha)**	**Irrigated**	**Rainfed**
	Sericulture			
	Plantation crops			

1.8	Livestock	Number	
	Cattle	-	

	local	70356	
	Crossbred	53595	
	Buffaloes total	175905	
	Commercial dairy farms(cooperatives)	503	
	Goat	44514	
	Sheep	2157	
	Others (Camel, Pig, Yak)	3973	

1.9	**Poultry**		
	Commercial	981860	
	Backyard		

1.10	**Inland Fisheries**	**Area (ha)**	**Yield (t/ha)**	**Production (MT)**
	Brackish water			
	Fresh water	1000	2.5	30

http://usnagar.nic.in/pages/display/170-statistical-handbook-2009

1.11 **Production and Productivity of 5 major crops (2008-2012)**

1.11	**Production and Productivity of 5 major crops**	**Kharif**		**Rabi**		**Summer**		**Total**	
		Production ('000t)	**Productivity (kg/ha)**	**Production ('000t)**	**Productivity (kg/ha)**	**Production ('000t)**	**Productivity (kg/ha)**	**Production ('000t)**	**Productivity (kg/ha)**
	Paddy	263.9	2851			29.293	3386	263.9	3118.5

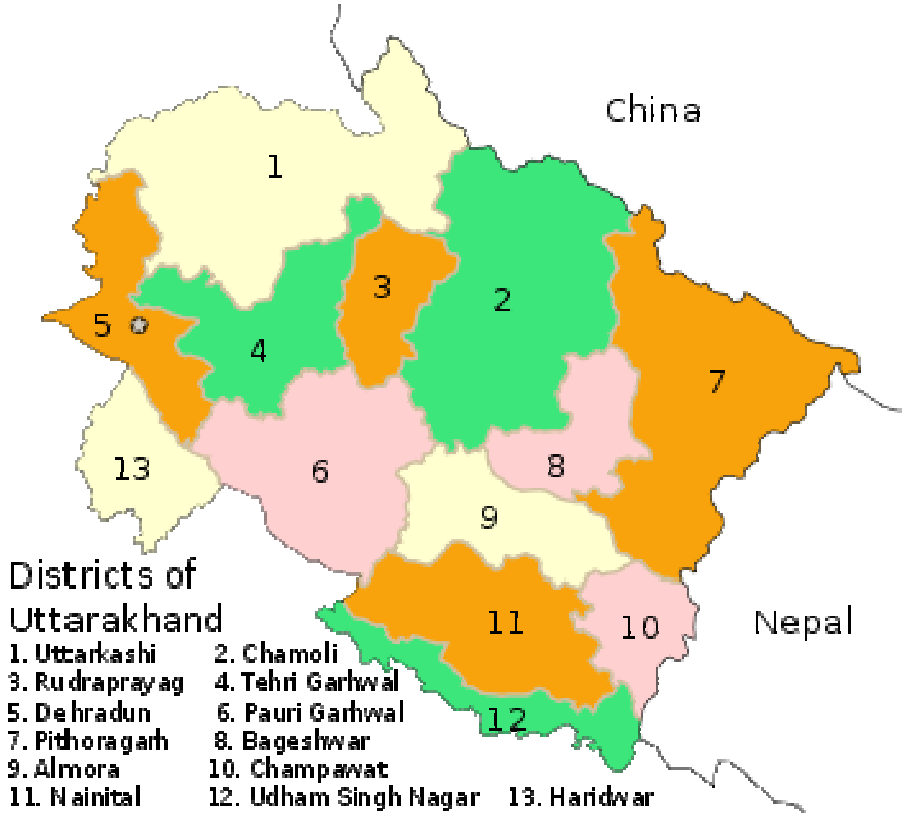
	Wheat			89.3	3815			89.3	3815
	Peas			6.1	1100			6.1	1100
	Mustard			4.8	841			4.8	841
	Sugarcane	1736.3	62220					1736.3	62220
	Others								
	Major Horticultural crops								**Productivity (t/ha)**
	Mango							21.07	9.0
	Litchi							1.03	1.6
	Guava							3.07	7.1
	Peach							10.1	7.5
	Potato							39.5	21.6
	onion							10.1	7.5

1.12	**Sowing window (start and end of sowing period)**	**Sugarcane**	**Paddy**	**Wheat**	**Potato**	**Veg. pea**	**Lahi**
	Kharif- Rainfed						
	Kharif-Irrigated	2nd week of September- 2nd week of October	2nd week of June- 2nd week of July				
	Rabi- Rainfed						
	Rabi-Irrigated	2nd week of February- 2nd week of March		2nd week of November-3rd week of December	2nd week of October–2nd week of November	2nd week of October–2nd week of November	2nd week of September-2nd week of October

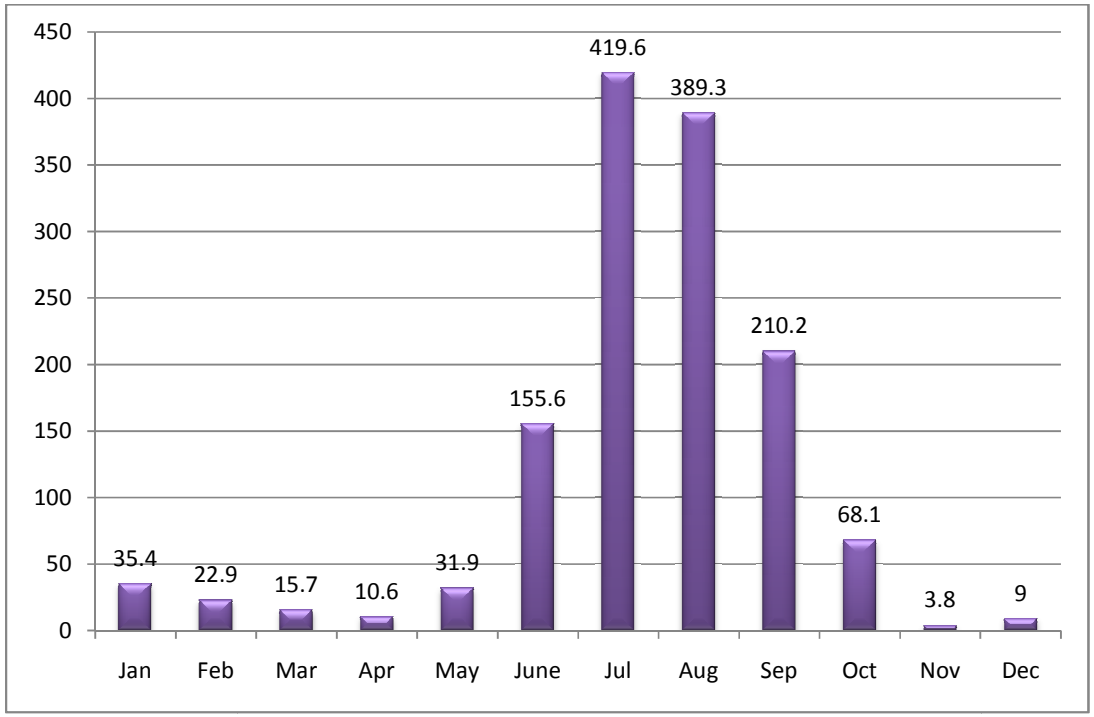
1.13	**What is the major contingency the district is prone to? (Tick mark)**	Regular	Sporadic	None
	Drought			√
	Flood		√	
	Cyclone			√
	Hail storm		√	
	Heat wave		√	
	Cold wave		√	
	Frost		√	
	Sea water inundation			√
	Pests and diseases	√		

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

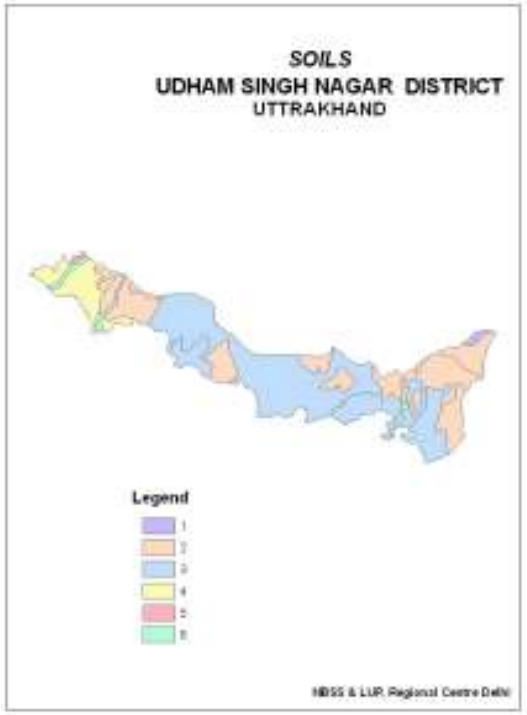
Annexure I


China
Nepal
Districts of
Uttarakhand
1. Uttarkashi
2. Chamoli
3. Rudraprayag
4. Tehri Garhwal
5. Dehradun
6. Pauri Garhwal
7. Pithoragarh
8. Bageshwar
9. Almora
10. Champawat
11. Nainital
12. Udham Singh Nagar
13. Haridwar

Annexure II


450
400
350
300
250
200
150
100
50
0
35.4
22.9
15.7
10.6
31.9
155.6
419.6
389.3
210.2
68.1
3.8
9
Jan
Feb
Mar
Apr
May
June
Jul
Aug
Sep
Oct
Nov
Dec

Annexure-III



SOILS OF UDHAM SINGH NAGAR DISTRICT OF UTTARAKHAND

Piedmont Plain (1-3% slope)

1. Deep, stratified loamy sandy soils .
2. Deep, loamy soils
3. Deep, loamy silt soils

Alluvial plain (0-1% slopes)

4. Deep, loamy soils
5. Deep, loamy soils

Active Flood Plain (0-3% slope)

6. Deep, sandy soils

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rain fed situation (*Kharif* season)

Condition	**Major Farming situation**	**Normal Crop/ cropping system**	**Suggested contingency measure**		
Delay by 2 weeks			**Change in crop/ cropping system**	**Agronomic measure**	**Remarks on implementation**
1st week of July (sowing is done generally by 20th of June with pre monsoon showers)	Lowland	Rice- Wheat	No Change	Life saving irrigation, Direct seeded rice, Application of water through low cost drip/ sprayer/sprinkler,Dust mulching,	
		Rice- Vegetable Pea-Summer Rice	No Change	Increased seed rate, Direct seeded Rice, Timely weeding, addition of organic manures (FYM/compost) @ 5-10 t/ha treated with *Trichoderma*, Dust mulching,	
		Rice-Sugarcane-Ratoon -Wheat	No Change		
		Rice –Potato-Maize	No Change		
	Upland	Rice- Wheat	No Change		
		Rice- Vegetable pea-Summer Rice	No Change		
		Rice-Sugarcane-Ratoon -Wheat	No Change	Sowing method, higher seed rate, addition of organic manures (FYM/compost) @ 5-10 t/ha	
		Rice-Potato- Maize	No Change		

Condition	Major Farming situation	Normal crop/cropping system	Suggested contingency measures		
Early season drought (delayed onset)			**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks 3rd week of July	Lowland	Rice- Wheat	No Change	Use failed crop as fodder, addition of organic manures (FYM/compost) @ 5-10 t/ha treated with *Trichoderma*	Supply of seeds through TDC, NSC Dept. of Agriculture and KVK
		Rice- Vegetable Pea-Summer Rice Rice-Sugarcane-Ratoon -Wheat	No Change	Use of short duration varieties, Addition of organic manures (FYM/compost) @ 5-10 t/ha treated with *Trichoderma,* Sowing may be delayed till appropriate soil moisture condition reaches	
		Rice –Potato-Maize	No Change	Bunding of terraces, Increased seed rate, Mulching, Sowing across the slope, Addition of organic manures (FYM/compost) @ 5-10 t/ha treated with *Trichoderma*	
	Upland	Rice- Wheat	No Change	Use failed crop as fodder, addition of organic manures (FYM/compost) @ 5-10 t/ha treated with *Trichoderma*	
		Rice- Vegetable Pea-Summer Rice	No Change	Use of short duration varieties, Addition of organic manures (FYM/compost) @ 5-10 t/ha treated with *Trichoderma,* Sowing may be delayed till appropriate	

				soil moisture condition reaches	
		Rice-Sugarcane-Ratoon -Wheat	No Change		
		Rice –Potato-Maize	No Change	Bunding of terraces, Increased seed rate, Mulching, Sowing across the slope, Addition of organic manures (FYM/compost) @ 5-10 t/ha treated with *Trichoderma*	

Condition	**Suggested contingency measures**				
Early season drought (Normal onset)	**Major farming situation**	**Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measure**	**Remarks on implementation**
Normal date of onset of followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Lowland	Rice- Wheat		Spray of NPK solution or N Top dress recommendation coinciding with rain splashes; rain water harvesting of surrounding fields, Mulching, Bunding, Life saving irrigation	Construction of rain water harvesting ponds through IWMP and MNREGS
		Rice- Vegetable Pea-Summer Rice	Gap filling/Re-sowing	Rain water harvesting of surrounding fields, Use local available plant material for mulch, Bunding, life saving irrigation	
		Rice-Sugarcane-Ratoon -Wheat	Gap filling through seedlings		

	Upland	Rice –Potato-Maize		N Top dress recommendation coinciding with rain splashes rain water harvesting of surrounding fields, Use local available plant material for mulch	
		Rice- Wheat	Gap filling/re-sowing		
		Rice- Vegetable Pea-Summer Rice			
		Rice-Sugarcane-Ratoon -Wheat		Spray of NPK solution or N Top dress recommendation coinciding with rain splashes; rain water harvesting of surrounding fields, Mulching, Bunding, Life saving irrigation	

Condition	**Suggested contingency measures**				
Early season drought (Normal onset)	**Major farming situation**	**Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measure**	**Remarks on implementation**
Mid season drought (long dry spell, consecutive 2 weeks rainless (<2.5 mm) period At vegetative stage	Lowland	Rice- Wheat	Use anti-transpirants, life saving irrigation if available	Use local available plant material for mulch Spray of NPK or N Top dress recommendation of Rain fed crop coinciding with rain splashes; rain water harvesting of surrounding	Construction of rain water harvesting ponds through IWMP and MNREGS as a long term drought
		Rice- Vegetable Pea-Summer Rice			
		Rice-Sugarcane-Ratoon -Wheat			

		Rice –Potato-Maize		fields, Mulching, Bunding, life saving irrigation	proofing measure
	Upland	Rice- Wheat	Use anti-transpirants, life saving irrigation if available, Thinning for reducing plant population	Foliar N management (1% urea spray) instead of top N dress; Efficient weed management and their *in-situ* mulching, Use local available plant material for mulch	
		Rice- Vegetable Pea-Summer Rice			
		Rice-Sugarcane-Ratoon -Wheat			
		Rice-Potato- Maize			

Condition	**Suggested contingency measures**				
At reproductive stage and terminal stage	**Major farming situation**	**Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measure**	**Remarks on implementation**
	Lowland	Rice- Wheat	Site-specific crop management technologies Life saving irrigation from rain water harvest ponds, • If rain comes Toria sowing in mid September	Foliar N management (1 % urea spray) instead of Top N dress only if the crop stand is still better, Spray of potassium nitrate and potassium chloride, Use local available plant material for mulch.	Construction of rain water harvesting ponds through IWMP and MNREGS
		Rice- Vegetable Pea-Summer Rice			
		Rice-Sugarcane-Ratoon -Wheat			
		Rice –Potato-Maize			
	Upland	Rice- Wheat			

		Rice- Vegetable Pea-Summer Rice			
		Rice-Sugarcane-Ratoon -Wheat			
		Rice-Potato- Maize			

2.1.3 Irrigated situation

Condition	**Suggested contingency measures**				
	Major farming situation[f]	**Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on implementation[j]**
Delayed/ limited release of water in canals due to low rainfall	Not applicable				

Condition	**Suggested Contingency measures**				
	Major farming situation[f]	**Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on implementation[j]**
Non release of water in canals under delayed onset of rainfall in catchment	Not applicable				

Condition	**Suggested contingency measures**

	Major farming situation[f]	Crop/cropping system[g]	Change in crop/cropping system[h]	Agronomic measures[i]	Remarks on implementation[j]
Lack of inflows into tanks due to insufficient /delayed onset of rainfall	Not applicable				

Condition	Suggested contingency measures				
	Major farming situation[f]	Crop/cropping system[g]	Change in crop/cropping system[h]	Agronomic measures[i]	Remarks on implementation[j]
Insufficient groundwater recharge due to low rainfall	Not applicable				

2.2.1 Unusual rains (untimely, unseasonal etc) (for both Rain fed and irrigated situations) **Kharif season**

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage[k]**	**Flowering stage[l]**	**Crop maturity stage[m]**	**Post harvest[n]**

Rice	Strengthening of field bundings, In water logged condition, form open drains about 60cm in depth and 45cm width across the field Sub Surface Drainage	Drain out excess water through drainage channels, NPK foliar application after water draining, Protection from BPH as per requirement	Drain out excess water Harvesting at physiological maturity	Storage at safer farmer warehouse/tent covering of produce, proper drying and storage of grains, use mechanical drier
Sugarcane	Form open drainage channels across the field	Drain out excess water through drainage channel		
Horticulture				
Mango, Litchi, Guava, Citrus fruits				Proper storage and immediate transportation to market/ Godown
Vegetable Pea, Potato, Tomato, Cucurbits, Radish	Form open drainage channels across the field	Drain out excess water through drainage channel	Harvesting at proper stage	Storage and immediate transportation to market
Heavy rainfall with high speed winds in a short span[2]				
Rice, Maize, Soybean	In water logged condition, form open drains across the field	Drain out excess water through drainage channel	Drain out excess water Harvesting at physiological maturity	Storage at safer warehouse, Proper drying and storage of grains
Vegetables (Pea, Tomato, Cucurbits)	Proper Staking/Drainage	Staking	Field drainage	Storage and immediate transportation to market
Outbreak of pests and diseases due to unseasonal rains				

Rice	**Brown plant hopper** Drain the water before use of insecticides and direct the spray towards the base of the plants. Buprofizin @ 25 SL1000 ml + Dichholorovos 1000 ml/ha in 500 littres of water 500 g/ha **Stem Borer**: Prolonged moist and humid condition leads to outbreak. Spray Cartap hydrochloride 25 kg/ha	**Brown plant hopper** Drain water before use of insecticides and direct the spray towards the base of the plants. Acephate 200 g /ac. **Blast:** Spray after observing initial infection of the disease, Carbendazim @ 1 g/l.	**Stem Borer**: Prolonged moist and humid condition leads to outbreak. Spray Cartap hydrochloride 25 kg/ha **False smut in fingermillet and rice**: Spray Mancozeb 75 WP500 ml/ha , Copper oxy chloride 50 WP 500 g, Propiconazole 5 EC 1000 ml/ha	
Maize	Proper Drainage	Top N dress after rain spells	Field drainage	
Veg. Pea & Capsicum	**Wilt** in low lying water logged patches: Drench Carbendazim 1.0 g/l at the base of plants	**Root rot**: Soil drenching with carbendazim 0.1 %, **Powdery mildew**: Spray carbendazim 0.1 %		

Horticulture				
Mango/Guava/Litchi/Citrus	Internal Necrosis, Mango Malformation, Guava Wilt, Citrus Decline, Fruit Cracking in litchi. Insect: Mango mealy Bug, Mango Hopper, Guava fruit fly, Lichi Mites	Spray Auxin at the flowing time @ 600 ppm for mango malformation, Boron spray in Lichi @ 0.2 % Plastic bands for mango hopper systemic insecticide spray for fruit fly		
Early Veg Pea and Capsicum	**Wilt** in low lying water logged patches: Drench Carbendazim 1.0 g/l at the base of plants	**Root rot**: Soil drenching with carbendazim 0.1 %, **Powdery mildew**: Spray Carbendazim 0.1 %	Field drainage	

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Continuous submergence for more than 2 days[2]		Not Applicable		
Sea water inundation[3]				

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				
Wheat	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Cold wave				
Mango		Provision of Shelter belt and wind break at the time of orchard establishment	Pruning of dead shoots/burned shoots followed by light irrigation	
Frost				
Mango		Light irrigation, Fuming in the orchard	Pruning of dead shoots/burned shoots followed by light irrigation	
Hailstrom	Not applicable			
Cyclone	Not applicable			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event[s]	**During the event**	**After the event**
Drought			

Feed and fodder availability	Increasing area under fodder production; Collect crop residues, and tree fodder to store at safe place, Use mangers, use chaff cutters, hay storage, and establish fodder banks and Stock sufficient Urea Molasses Mineral Block (UMMB), mineral and vitamin mix, 4% urea treatment of dry fodder	Utilization of fodder from Perennial & reserve sources, Open grazing in forests and alpine slopes/ community lands, Feeding of crop residues; use of mangers and chaff cutters, feeding of household waste, Prepare the silage of non-leguminous fodder crops for the scarcity period, Provide Urea Molasses Mineral Block (UMMB), mineral and vitamin mix, 4% urea treatment of dry fodder.	Availing Insurance, culling undesirable Livestock; Raising of fodder trees, replacement of unproductive animals with improved ones
Drinking water	Storage of water in tanks , Traditional water ponds , rivers	Utilization of stored water, Stall drinking , rivers , traditional water ponds	
Health and disease management	Advance preparation with medicines and vaccination, local ethno pharmaceutical and alternate medicines, keeping of disease resistance varieties.	Treatment of affected livestock by mass campaign, Modern veterinary care , veterinary camps , insulation, create smoke during nights in the cattle sheds to protect animals from mosquito and fleabites	Proper veterinary care , awareness , capacity building of locals, health care management
Floods			
Feed and fodder availability	Increasing area under fodder production; Collect crop residues, and tree fodder to store at safe place, Use mangers, use chaff cutters, hay storage, and establish fodder banks and Stock sufficient Urea Molasses	Utilization of fodder from Perennial & reserve sources, Open grazing in forests and alpine slopes/ community lands, Feeding of crop residues; use of mangers and chaff cutters, feeding of household waste, Prepare the silage of non-leguminous fodder crops for the scarcity period, Provide Urea Molasses Mineral Block (UMMB),	Availing Insurance, culling undesirable Livestock; Raising of fodder trees, replacement of unproductive animals with improved ones

	Mineral Block (UMMB), mineral and vitamin mix in moisture proof condition, 4% urea treatment of dry fodder	mineral and vitamin mix, 4% urea treatment of dry fodder.	
Drinking water	Storage of water in tanks , Traditional water ponds , rivers	Utilization of stored water after treatment using suitable antibiotics, Stall drinking	Rejuvenation
Health and disease management	Advance preparation with medicines and vaccination for FMD, PPR (Rinderpest in sheep and goat) & Dysentery, and local ethno pharmaceutical and alternate medicines, Deworming for flukes and roundworms.	Treatment of affected livestock by mass campaign, Modern veterinary care , Veterinary camps , insulation, create smoke during nights in the cattle sheds to protect animals from mosquito and fleabites, Treatment with medicines and vaccination for FMD, PPR (Rinderpest in sheep and goat) & Dysentery, and local ethno pharmaceutical and alternate medicines, Deworming for flukes, roundworms, ticks and mites, Proper sanitation	Proper Veterinary care , awareness , capacity building of locals and paravets, health care management
Cyclone	Not Applicable		
Cold wave			
Shelter/environment management	Brought back from high hill pasture lands to nearby pastures; restricted open grazing,	Stationary conditions in cowsheds , group living, dry grass flooring, gunny bags on windows, gunny bags wrapped on the belly of milking animals , restricted open grazing during sunny days only, adequate shelter. Prevent water-logging conditions in animal houses. In *Kachha* houses, the floor should be elevated with bricks, Feed straw & other fodder to milch animals with concentrates and protect the young ones from cold.	Open grazing, grazing in open sun , massage of milking animals and other species, hot water bath of animals

Health and disease management	Traditional herbs fed to animals	Warm living conditions, syrup of lassi (curd juice) after roasting fed to animals, avoid exposure to cold and rains/ snow. The prophylactic and preventive measures for the control of diseases should be adopted on the advice of veterinarian. For control of liver flukes, do the deworming of animals.	Open grazing in sunny days and feeding of medicinal herbs. In case of acute problem , veterinary care

2.5.2 Poultry

	Suggested contingency measures			Convergence/linkages with ongoing programs, if any
	Before the event	**During the event**	**After the event**	
Drought				
Shortage of feed ingredients	Surplus storage of poultry feed ; No special preparations these are kept as backyard activity	• Utilization of surplus feed; No impact as these is kept in captivity. • Moreover these are kept as backyard and household waste is sufficient for their keeping	Kept as backyard activity Availing Insurance Culling affected birds	Feed can be supplied through fair price shops , cooperatives and the SHGs/ VOs
Drinking water	Storage of water in tanks	Utilize stored water	Kept as backyard activity	Water storage structures can be constructed in collaboration with MNERAGA
Health and disease management	• Advance preparation with medicines and vaccination • Promote hardy and disease resistant poultry birds like kroiler, guinea fowl and desi birds procured from reliable sources.	Mass Vaccination, Locally managed with the help of veterinary care	Kept as backyard activity and local health care is practiced	Collaboration with rural development programmes
Floods				

Shortage of feed ingredients	Surplus storage of poultry feed in water/moisture proof condition; No special preparations these are kept as backyard activity	• Utilization of surplus feed; No impact as these is kept in captivity. • Moreover these are kept as backyard and household waste is sufficient for their keeping	Kept as backyard activity Availing Insurance Culling affected birds	Feed can be supplied through fair price shops , cooperatives and the SHGs/ VOs
Drinking water	Storage of water in tanks and use the water after treatment with suitable antibiotics	Utilize stored treated water	Kept as small scale / backyard activity	Water storage structures can be constructed in collaboration with MNERAGA
Health and disease management	Advance preparation with medicines and vaccination	Mass Vaccination, Locally managed with the help of veterinary care	Kept as backyard activity and local health care is practiced	Collaboration with rural development programmes
Cyclone	Not Applicable			
Heat wave and cold wave	• Cover the sides of the poultry sheds with foldable tourpelene or gunny bags to avoid impact/heat waves • Place the hey material or grass on top of poultry shed. • Place the small cage layered with grass/hey/gunny bags inside the poultry shed to act as refuge cage.			
Shelter/environment management	Proper Ventilation	Proper aeration and fan, open spacing, water supply, gunny bags on windows during cold wave, proper warming .supply of hot water during cold waves.	Kept as backyard activity	
Health and disease management	Local	Local and Veterinary care	Kept as backyard activity	

2.5.3 Fisheries

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Shallow water in ponds due to insufficient rains/inflows	• Water harvesting structures with rain water impounding from catchment areas • Keep a deeper portion as a refuge pond / depression/trench preferably at lower side of pond	• Up to 50% of pond surface area may be covered with floating algae like azolla to reduce evaporation. • Water to supplement at least 20% of the impoundment of pond to safeguard the stocked fish biomass may be arranged if available. • Partial or complete fish harvesting may be done in extreme events to reduce the density.	Water harvesting structures with rain water impounding from catchment areas; watershed development planning and implementations with focus on renovation and desilting of pond.
Impact of heat and salt load build up in ponds / change in water quality			
Floods	Not manageable in the torrent monsoon season		
Inundation with flood waters	Enclose the pond and inlet/outlet with suitable iron mesh net to prevent escape of stocked and incoming of wild fishes		
Water contamination and changes in BOD	Treat the water with lime		
Health and disease management	Rapid mobile veterinary team RMVT) may be formed, Provide suitable broad spectrum antibiotics (5%) with feed		
Cyclone	Not applicable		
Heat wave and cold wave			
Management of pond environment	Keep a deeper portion as a refugee pond / depression preferably at lower side of pond		
Health and disease management	Rapid mobile veterinary team (RMVT) may be formed		

[a] based on forewarning wherever available