

State: HIMACHAL PRADESH

Agriculture Contingency Plan for District: SHIMLA

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. (14.3)	
	Agro-Climatic Zone (Planning Commission)	Western Himalayan Region (I)	
	Agro Climatic Zone (NARP)	High Hill Temperate Wet Zone (HP-3)	
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Shimla and Kullu CHAMBA, KANGRA, KINNAUR, LAHUL & SPITI, MANDI, SIRMAUR	
	Geographic coordinates of district headquarters	Latitude	Longitude
		latitude 30°-45" and 31°-44" North	77°-0" and 78°-19" east
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Horticulture Research Station, Dr YS Parmar University of Horticulture and Forestry - Mashobra (Shimla) Phone No: 0177-2740261, 2740793 FAX-2740092,2740793	
	Mention the KVK located in the district with address	Krishi Vigyan Kendra, Karalash, Rohru, Shimla (HP). Himachal Pradesh 171 207 Phone 01781, 240365 (O), 01781-240365 (R), Dr. Narender Singh Kaith, Programme Co-ordinator (09418051577);shimla_kvkv@rediffmail.com; shimlakvkv@gmail.com;kainthns@yahoo.in	
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	IMD, Shimla. e mail : mc.sml@imd.gov.in, metcentresml@yahoo.co.in	

Source: DOA. 2009. District Agriculture Plan:

1.2	Rainfall	Normal RF(mm)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	745.02	4 th week of June	1 st week of September
	NE Monsoon (Oct-Dec):	36.36		
	Winter (Jan- Feb):	101.70		
	Summer (March-May):	116.94		
	Annual	1000.02		

Source: Directorate of Land Records, Shimla, HP.

1.3	Land use pattern of the district (latest statistics)	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)	508.322	84.302	128.703	14.957	249.215	12.375	6.831	11.939	10.855	5.710

Data source: DOAC, Govt of india

1.4	Major Soils (common names like red sandy loam deep soils (etc.))*	Area ('000 ha)	Percent (%) of total

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	67.7	141.5
	Area sown more than once	28.1	
	Gross cropped area	95.8	

Source: Statistical Outline of HP, 2008-09.

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	3.738		
	Gross irrigated area	4.333		
	Rainfed area	92.062		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals			
	Tanks	242	0.647	14.93
	Open wells			
	Bore wells			
	Lift irrigation schemes	27	0.339	07.82
	Micro-irrigation			
	Other sources (Kuhls)	158	3.347	77.25
	Total Irrigated Area		4.333	100.00
	Pump sets			
	No. of Tractors	NA	NA	NA
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited			
	Critical			
	Semi- critical			
	Safe			Ground water is of good quality
	Wastewater availability and use			
	Ground water quality	Good, EC<750µ mhos/cm at 25 ⁰ C		
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

Source: Statistical Outline of HP, 2008-09, DOA. 2009. District Agriculture Plan: Shimla, HP., Vol. IX

1.7 Area under major field crops & horticulture

S.No.	Major field crops cultivated	Area(000' ha)		
		Total	Irrigated	Rainfed
	Maize	11.46	0.45	11.01
	Paddy	1.21	0.76	0.44
	Wheat	13.06	0.70	12.32
	Barley	4.10	0.17	3.93
	Pulses (Rajamsh/moong/mash)	5.19	-	5.19
	Oil seeds(Mustard/ rapeseed)	0.71	-	0.17
Horticultural Crops				
	Apple	31.95		31.95
	Other temperate fruits (Pear etc.)	3.42		3.42
	Walnut & Dry Fruits	1.805		1.80
	Citrus	0.58		0.58
	Other fruits	0.6		0.60
Horticulture crops – Vegetables				
	Potato	6.2	0.99	5.2
	Other Vegetables (Cauliflower, French bean, Capsicum)	10.95		Not available

	Pea (green)	4.20		Not available
	Cabbage	1.75		Not available
	Tomato	0.70		Not available
Medicinal and Aromatic crops				
	<i>Valeriana jatamansi</i>	Less than 1 hectare	The medicinal plants are naturally found in forests and local inhabitants traditionally collect them as a source of supplementary farm income. However, cultivation of medicinal plants is also encouraged in isolated blocks and different medicinal plant species are also cultivated by few of progressive farmers	
	<i>Gentiana kurroo</i>	Less than 1 hectare		
	<i>Swertia chirayita</i>	Less than 1 hectare		
	<i>Aconitum heterophyllum</i>	Less than 1 hectare		
	<i>Viola serpens</i>	Less than 1 hectare		
Plantation crops				
	No plantation crops are available in Shimla district	Nil	Nil	Nil
Fodder crops*				
	Oats	0.022	-	0.022
	Berseem	0.006	-	0.006
	Total fodder crop area	0.028	-	0.028
4	Grazing land (permanent pastures and grazing lands)	249.2	-	249.2
5	Sericulture etc.			

6	Others (specify)			
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Source: District Agriculture Abstracts, Shimla 2009, Department of Agriculture, Shimla..

1.8	Livestock	Number ('000) 2003 census		
	Cattle	301.974		
	Buffaloes	16.292		
	Commercial Dairy Farms	-		
	Goat	98.223		
	Sheep	98.376		
	Others (Camel, Pig, Yak etc.)	-		
1.9	Poultry (Total)	27.714		
1.10	Inland Fisheries *			
		Water Spread Area (ha)	Yield (t/ha)	Production ('000 Mtons)
	i) Brackish water	-	-	-
	ii) Fresh water	-	-	0.168 (There are 274 registered fishermen)
	Others	-	-	Not available

- Fish species belong to the families Solmonidae, Cyprinidae, Psilsorhy- Chidae ,Cobitidae, and Sisoridae. Trout , Mahaseer , Snowtrout Danio,Crossochiclus,Namecbilus etc. are the major species

Source: DOA. 2009. District Agriculture Plan: Shimla, HP., Vol. IX

1.11 Production and Productivity of major crops

1.1 1	Name of crop	Kharif		Rabi		Summer		Total	
		Production ('000MT)	Productivity (kg/ha)	Production ('000MT)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000MT)	Productivity (kg/ha)
	Maize	27.59	2389.5					27.5	2389.5
	Paddy	1.75	1171.9					1.7	1171.9
	Wheat			13.25	1299.6			13.25	1299.6
	Barley			4.61	1239.8			4.614	1239.8

Pulses(Rajmash/Moong/Mash)	1.88	396	0.058	714			1.93	555
Oil seeds (Mustard/Rapeseed)	0.0568	2705	0.1538	319			0.21	1512
Apple							233.8	8171.6
Other Temperate Fruits (Pear etc.)							4.082	1189.4
Walnut & Dry Fruits							0.668	367.0
Citrus							0.101	178.8
Other fruits							0.056	141.8
Potato	26.503	16312	6.394	1349.59			32.897	17661.5
Other Vegetables (Cauliflower, French bean, Capsicum)							167.87	18022.6

Source: Directorate of Land Records, Shimla, HP

1.12	Sowing window for 5 major field crops	Maize	Paddy	Wheat	Pulses (Rajmash/Moong/Mash)	Potato	Vegetables (Pea, Tomato, Cabbage, capsicum, Cauliflower)
	Kharif- Rainfed	2 nd week of May- 2 nd week of June			2 nd week of June - 1 st week of July	1 st week of April	1 st week of March - 4 th week of June
	Kharif-Irrigated	3 rd week of May – 2 nd week of June	2 nd week of June -2 nd week of July		2 nd week of June - 4 th week of June	1 st week of April	1 st week of March - 4 th week of June
	Rabi- Rainfed	-	-	4 th week of October - 2 nd week of November	-	2 nd week of January - 4 th Week of January	1 st week of October - November
	Rabi-Irrigated	-	-	4 th week of October to 2 nd week of November	-	2 nd week of January - 4 th Week of January	1 st week of October - November

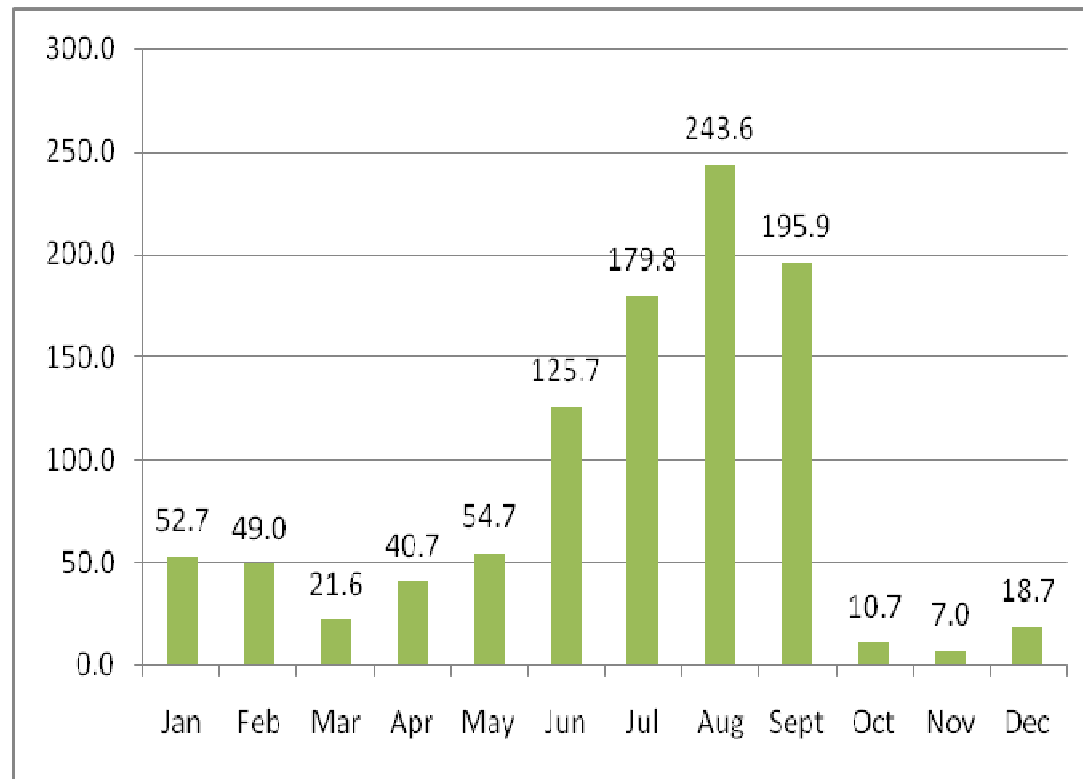
	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
-	Drought		√	
	Flood			√
	Cyclone			√
	Hail storm	√		
	Heat wave			√
	Cold wave		√	
	Frost			√
	Sea water intrusion			√
	Pests and disease outbreak (Borers, Fungal, Bacterial and Viral diseases)		√	
	Others (specify)			√

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

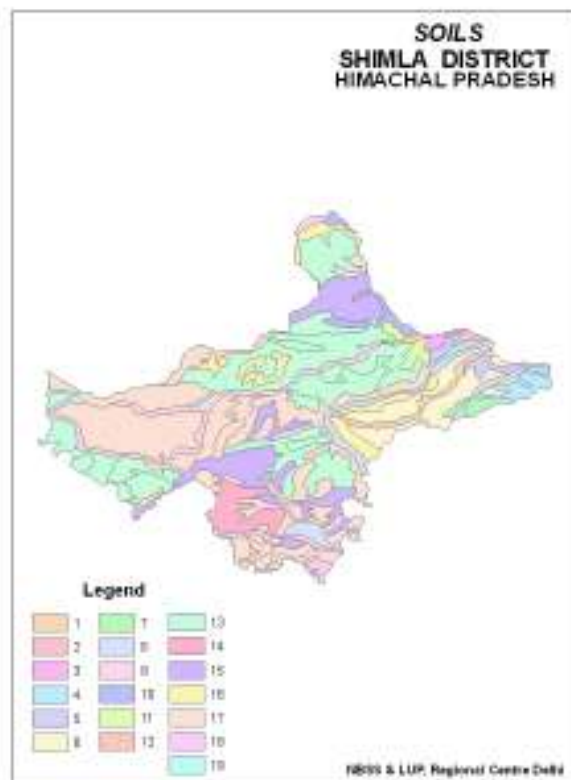
Annexure I



Annexure II



Annexure III



New Soil Unit	Description	Area (ha)
SOILS OF GREATER HIMALAYAS		
SOILS OF SUMMITS AND RIDGE TOPS		
1	Rock outcrops covered with glaciers; <i>associated with</i> : Shallow, sandy-skeletal soils with severe erosion and strong stoniness	9625.43
SOILS OF MOUNTAINS AND VALLE GLACIERS		
2	Rock outcrops and valley glaciers; <i>associated with</i> : Shallow, sandy-skeletal soils with severe erosion and moderate stoniness	1922.47
SOILS OF SIDE / REPOSED SLOPES		
3	Rock outcrops; <i>associated with</i> : Medium deep, loamy-skeletal soils with severe erosion and moderate stoniness	1248.13
4	Rock outcrops; <i>associated with</i> : Shallow, loamy-skeletal soils with severe erosion and moderate stoniness	7281.57
5	Rock outcrops; <i>associated with</i> : Medium deep, loamy-skeletal, calcareous soils with severe erosion and strong stoniness	4314.59
6	Medium deep, sandy-skeletal over fragmental soils with severe erosion and moderate stoniness; <i>associated with</i> : Rock outcrops	21505.09
7	Deep, loamy, calcareous soils with severe erosion and moderate stoniness; <i>associated with</i> : Medium deep, loamy-skeletal calcareous soils with moderate erosion	2345.15
SOILS OF GLACIO-FLUVIAL VALLEY		
8	Medium deep, sandy-skeletal soils with severe erosion and strong stoniness; <i>associated with</i> : Deep, loamy-skeletal soils	11955.16
SOILS OF LESSER HIMALAYAS		
SOILS OF SUMMITS AND RIDGE TOPS		
9	Shallow to medium shallow, loamy soils with severe erosion	28128.47
SOILS OF SIDE / REPOSED SLOPES		
10	Rock outcrops; <i>associated with</i> : Medium deep, loamy-skeletal soils with severe erosion and moderate stoniness	19852.28
11	Medium deep, sandy soils with severe erosion	3561.877

	12	Deep, loamy-skeletal soils with severe erosion and slight to moderate stoniness; <i>associated with</i> : Loamy soils	1211.083
	13	Shallow, loamy-skeletal soils with severe erosion and strong stoniness; <i>associated with</i> : Rock outcrops	120358.5
	14	Deep, loamy soils with severe erosion	15449.53
	15	Medium deep, loamy, calcareous soils with moderate to severe erosion	68767.0
	16	Shallow to medium deep, loamy soils with moderate to severe erosion and slight stoniness	34613.18
	17	Medium deep to deep loamy soils with moderate to severe erosion	156943.6
	18	Deep, loamy over sandy soils with very slight erosion and moderate stoniness; <i>associated with</i> : Shallow, loamy soils with moderate erosion and moderate stoniness	1605.409
	SOILS OF SIDE / REPOSED SLOPES		
	19	Medium deep to deep, loamy-skeletal soils moderate to severe erosion; <i>associated with</i> : Loamy soils with moderate erosion	2409.088
	Total area		513097.6

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 including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks 2 nd week of July	Scanty rainfall sandy loam to clay loam soils	a.Maize-Wheat b.Maize+Pulses-Wheat c.Maize-Barley	.Maize-Wheat b.Maize+Pulses-Wheat c.Maize-Barley Maize; DKH -9705,L-118,Him-123,PSCL-4640,Sartaj, Early Composite,PSCL-3438 Wheat : HPW-184, 155,89-147,240,HPW-42, Raj-3777,HS-295 Rajmash : K-198, Hp-12,HPR-35,SRC-74,Him-1,KRC-8 Mash:UPU-0031,UG-218,Pant U-19,T-9,Palampur-93 Barley:HBL_276,HBL-113,Dolma,HBL-87,HBL-316,HBL-391	Normal package practices	Link department of agriculture, NSC, SAU for the supply of seed and KVK for need based training for the farmers
		Paddy-Wheat/ Paddy-Barley	Paddy-Wheat/ Paddy-Barley Paddy: HPR-1156,HPR-2143,VL Dhan-221China-988,R-575		
		Cabbage-pea Cabbage:Pusa drum Head,Pride of India,Golden Acre, Pusa Mukta, Pea:Lincolon,Arkel,PB-89,Azad P-1	No Change		
		Potato-pea Potato: Kufri Jyoti, Kufri Chandermukhi Pea:Lincolon,Arkel,PB-89,Azad P-1	Potato-pea Potato: Kufri Jyoti, Kufri Chandermukhi Pea:Lincolon,Arkel,PB-89,Azad P-1		

		Tomato+pea Tomato:Solan Gola, Naveen,Roma,Palam Pride,MTH- 15,Solan Vajar,Rupali Pea:Lincolon,Arkel,PB-89,Azad P-	Tomato+pea Tomato:Solan Gola, Naveen,Roma,Palam Pride,MTH- 15,Solan Vajar,Rupali Pea:Lincolon,Arkel,PB-89,Azad P-		
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Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 4 weeks 4 th week of July	Scanty Rainfall Sandy loam to clay loam Soils	a.Maize-Wheat b.Maize+Pulses-Wheat c.Maize-Barley	Maize-Wheat ; a.Maize+Wheat b.Maize+Pulses+Wheat c.Maize+Barley Intercropping with legumes-like moong , rajmash, beans, cowpea Maize; DKH -9705,L-118,Him-123,PSCL-4640,Sartaj, Early Composite,PSCL-3438 Wheat : HPW-184, 155,89-147,240,HPW-42, Raj-3777,HS-295 Rajmash : K-198, HP-12,HPR-35, SRC-74,Him-1,KRC-8 Mash: UPU-0031,UG-218,Pant U-19,T-9,Palampur-93 Barley:HBL_276,HBL-113,Dolma,HBL-87,HBL-316,HBL-391	Mulching with lantana, pine needles (5 tonnes per ha) Deep Sowing	Link department of agriculture, NSC, SAU for the supply of seed and KVK for need based training for the farmers
		Paddy-Wheat Paddy-Barley	Paddy-Wheat Paddy-Barley Paddy: HPR-1156,HPR-2143,VL Dhan-221China-988,R-575	Transplanting Mulching with lantana, pine needles (5 tonnes per ha)	

		Cabbage-pea	Paddy-Wheat Paddy-Barley Paddy: HPR-1156,HPR-2143,VL Dhan-221 China-988,R-575	-	
		Potato-pea	Potato+pea Potato: Kufri Jyoti, Kufri Chandermukhi Pea:Lincolon,Arkel,PB-89,Azad P-1	Delay in sowing by 2 weeks	
		Tomato+pea	Tomato+pea Tomato:Solan Gola, Naveen,Roma,Palam Pride,MTH-15,Solan Vajar,Rupali Pea:Lincolon,Arkel,PB-89,Azad - Tomato+pea	Gap filling with improved variety Mulching with lantana, pine needles (5 tonnes per ha)	

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 6 weeks August 2 nd week	Scanty Rainfall Sandy Loam/ Clay Loam Soils	a.Maize-Wheat b.Maize+Pulses-Wheat c.Maize-Barley	Fodder crops: Berseem, oats, white clover , napier Bajra, red clover, Lucerne Vegetables	Regular weeding Site specific nutrient management as per soil test results Maintenance of soil cover	Link department of agriculture, NSC, SAU for the supply of seed and KVK for need based training for the farmers
		Paddy-Wheat Paddy-Barley	-	Addition FYM 1-2 tonnes /ha and organic manures	
		Cabbage-pea	Cabbage:Pusa drum Head,Pride of India,Golden Acre, Pusa Mukta, Pea:Lincolon,Arkel,PB-89,Azad P-1	Intercropping with legumes mash, moong ,rajmash Mulching	
		Potato-pea	Potato+pea Potato: Kufri Jyoti, Kufri Chandermukhi Pea:Lincolon,Arkel,PB-89,Azad P-1	Thinning (5-10%) Ridge and furrow cultivation	

		Tomato+pea	Tomato+pea Tomato:Solan Gola, Naveen,Roma,Palam Pride,MTH-15,Solan Vajar,Rupali Pea:Lincolon,Arkel,PB- 89,Azad P-		
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Condition	Major Farming situation ^a	Normal Crop / Cropping system ^b	Suggested Contingency measures		
			Change in crop / cropping system ^c including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 8 weeks (August 4 th week))	Scanty Rainfall Sandy Loam/ Clay Loam Soils	Maize-Wheat ; a.Maize+Wheat b.Maize+Pulses+Wheat c.Maize+Barley	Pulses, fodder crops and short season crops like vegetables Pulses: Mash, Moong , rajmash Fodder crops: Berseem ,oats, white clover , napier Bajra, red clover, Lucerne ,cherry Vegetables : Tomato , capsicum, beans Intercropping with legumes mash, moong ,rajmash	Regular weeding Site specific nutrient management as per soil test results Maintenance of soil cover Addition of high doses of FYM 1-2 tonnes /ha and organic manures Mulching Ridge and furrow cultivation	Link department of agriculture, NSC, SAU for the supply of seed and KVK for need based training for the farmers
		Paddy-Wheat Paddy-Barley			
		Cabbage+pea			
		Potato+pea			
		Tomato+pea			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Early season drought (Normal onset)					

Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Scanty Rainfall Sandy Loam/ Clay Loam Soils	Maize-Wheat ; a. Maize+ Wheat b.Maize+Pulses+Wheat c.Maize+Barley	Resowing/ Gap filling with higher Seed Rate (15-20%) Wider Spacing (10-20%) for maize, wheat Regular weeding Maintenance of soil cover Intercropping with legumes- like mash, rajmash, beans Thinning (10-20%) Ridge and furrow cultivation	Addition of FYM and organic manures) (2-3 tonnes /ha) Mulching- in crop rows Spray 2% urea during the dry spell for crops like maize and pulses	Link department of agriculture, NSC, SAU for the supply of seed and KVK for need based training for the farmers
		Paddy-Wheat Paddy-Barley			
		Cabbage+pea	Resowing/ Gap filling with higher Seed Rate (15-20%) Wider Spacing (10-20%)		
		Potato+pea	Regular weeding Maintenance of soil cover Ridge and furrow cultivation		
		Tomato+pea			

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	Scanty Rainfall Sandy Loam/ Clay Loam Soils	Maize-Wheat ; a.Maize+Wheat b.Maize+Pulses+Wheat c.Maize+Barley	Life saving irrigation Resowing/ Gap filling with higher (15-20%) Seed Rate	Addition of FYM and organic manures) (2-3 tonnes /ha)	
		Paddy-Wheat Paddy-Barley	Maintenance of soil cover Intercropping with legumes	Mulching Mulching in crop	

			Thinning	rows with green materials	
			Ridge and furrow cultivation	Spray 2% urea to pulses during the dry spell	
		Cabbage+pea	Life saving irrigation		
		Potato+pea	Resowing/ Gap filling with higher (15-20%) Seed Rate		
		Tomato+pea			
			Maintenance of soil cover		
			Intercropping with legumes Thinning		
			Ridge and furrow cultivation		

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 flowering/ fruiting stage	Scanty Rainfall Sandy Loam/ Clay Loam Soils	Maize-Wheat ; a.Maize+Wheat b.Maize+Pulses+Wheat c.Maize+Barley	Life saving irrigation	Addition of high doses of FYM and organic manures) (2-3 tonnes /ha) Mulching- in crop rows	
		Paddy-Wheat Paddy-Barley	Maintenance of soil cover		
		Cabbage+pea	Thinning		
		Potato+pea	Ridge and furrow cultivation		
		Tomato+pea			

Condition			Suggested Contingency measures		
Terminal drought (Early withdrawal of monsoon)	Major Farming situation	Normal Crop/cropping system	Crop management	Rabi Crop planning	Remarks on Implementation

	Scanty Rainfall Sandy Loam/ Clay Loam Soils	Maize-Wheat ; a.Maize+Wheat b.Maize+Pulses+Wheat c.Maize+Barley	Life saving irrigation Harvest at physiological maturity	If the damage is severe, harvest as fodder and plan for land preparation and sowings of rabi crops like oil seeds/ pulses based: Torla, Gobhi Sarson, Brown Sarson, Gram, Masoor (Sep-Oct)	Link department of agriculture, NSC,
		Paddy-Wheat Paddy-Barley			
		Cabbage+pea			
		Potato+pea			
		Tomato+pea			

2.1.2 Drought - Irrigated situation (through *Kuhls*)

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in <i>kuhls</i> due to low rainfall	Not applicable as it is a community resource and water is release from Glaciers melt or local rivers/ nallas directly				

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in <i>kuhls</i> due to low rainfall	Scanty Rainfall Sandy Loam/ Clay Loam Soils, Steep topography, Perennial/ seasonal rivers, streams, springs, tanks	Maize-Wheat ; a.Maize+Wheat b.Maize+Pulses+Wheat c.Maize+Barley	Maize+Pulses+Wheat	Life saving irrigation from constructing tanks (mini ponds lined with LDPE sheets of 1000 gauge), Use of micro-irrigation systems Mulching in crop rows	Supply of seeds through Govt. Agencies Supply of seed drills and farm machinery through govt. agencies Supply of drought
		Paddy-Wheat Paddy-Barley	Oilseeds+Wheat		

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
		Cabbage+pea	Cabbage+Capsicum+pea	Regular weeding Ridge and furrow cultivation	tolerant and HYV seeds Supply of LDPE sheets for farm pond lining through Govt. agencies like District Rural Development Agencies , MNERAGA , Horticulture Mission projects of Department of Horticulture , other projects of Agriculture
		Potato+pea	Potato+Capsicum+pea	Contour planting Mulching in crop rows Life saving irrigation through water harvesting systems Use of micro irrigation systems	

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in <i>kuhls</i> under delayed onset of monsoon in catchment	Not Applicable as it is a community resource				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation

Condition	Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Not Applicable			

Condition	Suggested Contingency measures			
	Major Farming situation ^f	Normal Crop/cropping system ^g	Change in crop/cropping system ^h	Agronomic measures ⁱ
Insufficient groundwater recharge due to low rainfall	Not Applicable			

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations)

Condition	Suggested contingency measures			
Continuous high rainfall in a short span leading to water logging	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Maize	Drain out the excess water as early as possible, Apply 20 kg N + 10 kg K /ha after draining excess water, Inter cultivation Loosen and aerate the soil at optimum soil conditions Weeding, Earthing up ,	Stalk rot control with Calcium Hypochlorite (bleaching powder), top dressing of N but do not mix bleaching powder	Drainage and Cob harvesting from standing crop if physiologically mature	Storage at warehouse, Covering of produce with polythene sheet
Wheat, Barley	Drain out the excess water, Add additional dose of nitrogen (25kg/ha)	Complete drainage of water, Control of yellow rust with 0.1% Propiconazole	Complete drainage of water	If rains are continuing take to safe storage place and before winnowing ensure that the moisture is 12-14%
Paddy	Strengthening of field bunds	Draining excess water	Drain excess water	Storage at safer farmer

	<p>Drain excess water</p> <p>Topdressing of 20-30 kg N/ha after removal of excess water</p> <p>Micro nutrient deficiency correction for Zinc and Fe if need arises</p>	<p>Top N dress after water draining</p> <p>Spray Zn So4 0.2% if it is less than 45 days</p>	<p>Harvest the crop at physiological maturity</p>	<p>warehouse/tent covering of produce</p> <p>Spray common salt at 5% on panicles to prevent germination and spoilage of straw from moulds</p>
<p>Pulses (Rajmash/Moong/Ma sh)</p>	<p>Drain the excess water as early as possible</p> <p>Apply 10--15 kg N /ha after draining excess water</p> <p>To spray KNO₃ 1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 at 1% to support nutrition</p> <p>Spray fungicides like Copper oxy chloride 0.3 % or Carbendazim 0.1 % or Mancozeb 0.25%</p> <p>Take up timely control measures against the out break of pests like <i>Helicoverpa</i> etc.</p>	<p>Drain the excess water as early as possible</p> <p>Apply 10-15 kg N /ha after draining excess water</p> <p>To spray KNO₃ 1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 at 1% to support nutrition</p> <p>Spray fungicides like Copper oxy chloride 0.3 % or Carbendazim 0.1 % or Mancozeb 0.25% against blight and wilt</p> <p>Take up timely control measures against the outbreak of pests like <i>Helicoverpa</i> etc.</p>	<p>Drain the excess water as early as possible</p> <p>Allow the crop to dry completely before harvesting</p>	<p>Storage at safer farmer warehouse/tent covering of produce</p> <p>Dry the produce well to maintain 10-12% of moisture before bagging and marketing</p>
<p>Oil seeds (Mustard /Rapeseed)</p>	<p>Complete drainage, Channelization of excess water</p> <p>Apply 20-25kg/ha after drainage excess water to reduce yellowing of leaves and better plant growth</p> <p>Interculture in between crop rows to improve aeration of the soil and to control weeds</p>	<p>Complete drainage, Channelization of excess water</p> <p>Need based plant protection measures</p>	<p>Complete drainage, Channelization of excess water</p>	<p>Immediate shifting of produce to drier places, Drying in shade, Safe storage against pests & diseases</p> <p>Complete drainage, Channelization of excess water</p>
<p>Heavy rainfall with high speed winds in a short span2</p>				
<p>Maize</p>	<p>To drain out the excess water at the earliest</p>	<p>Drain out the excess water at the earliest</p>	<p>Drain out the excess water at the earliest</p>	<p>Drain out the excess water at the earliest</p>

	<p>Intercultivation and earthing up to be done Apply 40 kg N + 25 kg K /ha after draining excess water</p> <p>Take up plant protection measures against possible pests and disease incidence</p>	<p>Intercultivation and earthing up to be done Apply 40 kg N + 25kg K /ha after draining excess water</p> <p>Take up plant protection measures against possible pests and disease incidence</p>	<p>Take up plant protection measures against possible pests and disease incidence</p>	<p>Cob picking to be done after they are dried fully</p>
Wheat	<p>Surface drainage to drain out excess water Interculture after draining excess water to improve aeration of the soil and to control the weeds Apply 20-30 Kg N/ha to regain lost vigor</p>	<p>Surface drainage to drain out excess water Interculture after draining excess water to improve aeration of the soil and to control the weeds Apply 20-30 Kg N/ha to regain lost vigor</p>	<p>Surface drainage to drain out excess water Apply 20-30 Kg N/ha to regain lost vigor Harvest the produce on clear sunny day</p>	<p>To cover produce with plastic sheet or shift produces to farm shed Ensure proper drying of grain (10-12% of moisture) before bagging and marketing</p>
Barley	<p>Complete drainage, Channelization of excess water Interculture after draining excess water to improve aeration of the soil and to control the weeds Apply 20-30 Kg N/ha to regain lost vigor</p>	<p>Complete drainage, Channelization of excess water Interculture after draining excess water to improve aeration of the soil and to control the weeds Apply 20-30 Kg N/ha to regain lost vigor</p>	<p>Complete drainage, Channelization of excess water Surface drainage to drain out excess water Apply 20-30 Kg N/ha to regain lost vigor Harvest the produce on clear sunny day</p>	<p>Complete drainage, Channelization of excess water cover produce with plastic sheet or shift produces to farm shed Ensure proper drying of grain (10-12% of moisture) before bagging and marketing</p>
Paddy	<p>Drained out excess water as early as possible</p>	<p>. Drain out the excess water at the earliest 2. Immediately after the water recedes apply a booster dose of 20kg Urea+15kg MOP application, preferably in the mud followed by light irrigation after 24 hrs. 3. If mortality of hills takes and field is patchy, gap filling with split tillers is recommended along with application of booster dose of 20kg urea and 15kg MOP 4. Take-up need based plant protection measures</p>	<p>Drain out the excess water at the earliest 2 Take up need based plant protection measures</p>	<p>1. Drain out water .Spread sheaves loosely in field or field bunds where there is no water stagnation 2. Spray common salt at 5% on panicles to prevent germination and spoilage of straw from moulds 3. Thresh after drying the sheaves properly 4. Ensure proper grain moisture before storing 5. Grow varieties having seed dormancy in flood prone areas</p>

Pulses (Rajmash/Moong/Ma sh)	1. Drain the excess water as early as possible 2. Apply 10-15 kg N /ha after draining excess water 3. To spray KNO ₃ 1 % or water soluble fertilizers at 1% to support nutrition 4. Spray fungicides like Copper oxy chloride 0.3 % or Carbendazim 0.1 % or Mancozeb 0.25% 5. Take up timely control measures against the outbreak of pests like <i>Helicoverpa</i> etc.	1. Drain the excess water as early as possible 2. Apply 4-5 kg N /acre after draining excess water 3. To spray KNO ₃ 1 % or water soluble fertilizers at 1% to support nutrition 4. Spray fungicides like Copper oxy chloride 0.3 % or Carbendazim 0.1 % or Mancozeb 0.25% against blight and wilt 5. Take up timely control measures against the outbreak of pests like <i>Helicoverpa</i> etc.	1. Drain the excess water as early as possible 2. Allow the crop to dry completely before harvesting	Complete drainage, Channelization of excess water
Oil seeds (Mustard /Rapeseed)	Complete drainage, Channelization of excess water	Complete drainage, Channelization of excess water	Complete drainage, Channelization of excess water	Complete drainage, Channelization of excess water
Horticulture				
Apple	Complete drainage, Channelization of excess water Drain excess water from the base of the tree Till the soil with in base of the tree to improve soil aeration and to control weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth	Complete drainage, Channelization of excess water Drain excess water from the base of the tree Till the soil with in base of the tree to improve soil aeration and to control weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth Hormonal or multi nutrient spray to promote flowering	Complete drainage, Channelization of excess water Till the soil with in base of the tree to improve soil aeration and to control weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth Hormonal or multi nutrient spray to promote flowering	Complete drainage, Channelization of excess water Harvest the fruits on clear sunny day
Other Temperate Fruits (Pear etc.)	Complete drainage, Channelization of excess water Drain excess water from the base of the tree Till the soil with in base of the tree to improve soil aeration and to control	Complete drainage, Channelization of excess water Drain excess water from the base of the tree Till the soil with in base of the tree to improve soil aeration and to control	Complete drainage, Channelization of excess water Till the soil with in base of the tree to improve soil aeration and to control weeds Apply 40-50 kg FYM/ tree or	Complete drainage, Channelization of excess water

	weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth	weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth Hormonal or multi nutrient spray to promote flowering	recommended nutrients to reduce yellowing and for better growth Hormonal or multi nutrient spray to promote flowering	
Walnut & Dry Fruits	Complete drainage, Channelization of excess water	Complete drainage, Channelization of excess water	Complete drainage, Channelization of excess water	Complete drainage, Channelization of excess water
Citrus	Complete drainage, Channelization of excess water Drain excess water from the base of the tree Till the soil with in base of the tree to improve soil aeration and to control weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth	Complete drainage, Channelization of excess water Drain excess water from the base of the tree Till the soil with in base of the tree to improve soil aeration and to control weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth Hormonal or multi nutrient spray to promote flowering	Complete drainage, Channelization of excess water Till the soil with in base of the tree to improve soil aeration and to control weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth Hormonal or multi nutrient spray to promote flowering	Complete drainage, Channelization of excess water
Other fruits	Complete drainage, Channelization of excess water Drain excess water from the base of the tree Till the soil with in base of the tree to improve soil aeration and to control weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth	Complete drainage, Channelization of excess water Drain excess water from the base of the tree Till the soil with in base of the tree to improve soil aeration and to control weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth Hormonal or multi nutrient spray to promote flowering	Complete drainage, Channelization of excess water Till the soil with in base of the tree to improve soil aeration and to control weeds Apply 40-50 kg FYM/ tree or recommended nutrients to reduce yellowing and for better growth Hormonal or multi nutrient spray to promote flowering	Complete drainage, Channelization of excess water
Outbreak of pests and diseases due to unseasonal rains	-			

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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 intrusion ³				

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

Extreme event type	Suggested contingency measure ^r			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	Not applicable (It is found only in limited plain areas and has no frequent occurrence)			
Cold wave				
Horticulture				
Apple	Production of nursery plants in poly chambers	Light irrigation on foliage Heavy pruning during dormancy Coating of plants through tree spray oils	For improving fruit setting placement of bee hives	Proper packing and grading of fruits for safe storage and transportation to destination APMC's
Other temperate fruits			Placement of pollenizer bouquets	
Frost				
Pea	Grow seedling in low poly tunnels	Mist formation with light irrigation	Light irrigation	Removal of affected pods/fruits
Tomato				Proper packing & grading of fruits
Horticulture				
Apple	Use shade nets Light irrigation in evening period	Mist formation with light irrigation Use of foggers	Light irrigation	Removal of injured pods/fruits
Mango				Proper packing & grading of fruits
Litchi				

Hailstorm				
Pea	Use of anti hail nets	In hail prone areas grow these vegetable under shade net or in playhouses or protected structures	Use of shade nets to protect from hail injuries Use of plant growth regulators for injury filling	Removal of injured pods/fruits Proper packing of graded fruits
Tomato				
Cucurbits				
cauliflower				
Horticulture				
Apple	Use of shade nets	Use of anti hail nets wherever feasible	Use of anti hail nets Use of plant growth regulators for injury filling Remove hailed/ injured fruits Use of antihail guns wherever feasible	Remove injured fruits Safe storage of graded fruit at pack house
Apricot				
Plum				
Cyclone	Not applicable			

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	Increasing area under fodder crops; Collect crop residues, collect tree fodder, use mangers, use chaff cutters , hay storage ,	Utilization of fodder from Perennial & reserve sources, Open grazing in forests and alpine slopes/ community lands and 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.	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	Rejuvenation of water sources
Health and disease management	Advance preparation with medicines and vaccination, Local ethno pharmaceutical and modern medicines	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			
Drinking water			
Health and disease management			
Cyclone			
Feed and fodder availability			
Drinking water			
Health and disease management			
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 <i>Kachha</i> houses, the floor should be elevated with bricks , Feed straw + berseem 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

^s based on forewarning wherever available

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 preparation s 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	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				
Drinking water				
Health and disease management				
Cyclone				
Shortage of feed ingredients				
Drinking water				
Health and disease management				
Heat wave and cold wave				
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	

2.5.2 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	Ensuring increased water supply through water harvesting and storage tanks	Ensuring increased water supply through water harvesting and storage tanks	Availing Insurance Timely cleaning of tanks
(ii) Changes in water quality	Removal of poor quality water	Removal of poor quality water	Removal of poor quality water
(iii) Any other			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Ensuring increased water supply through water harvesting and storage tanks	Ensuring increased water supply through water harvesting and storage tanks	Availing Insurance Timely cleaning of tanks
(ii) Impact of salt load build up in ponds / change in water quality	Removal of poor quality water, There is also problem of silting due to opening of gates by the hydro projects which lead to mortality of the fishes. The hydro agencies are accordingly requested to release less of silt in particular day.	Removal of poor quality water	Removal of poor quality water
(iii) Any other			
2) Floods			
A. Capture	Not applicable		

	(No specific action is taken as it is a supporting activity only and fishes are collected from natural ponds, rivers only)		
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	Not applicable (No specific action is taken as it is a supporting activity only and fishes are collected from natural ponds, rivers only.)		
(ii) Water contamination and changes in water quality			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, huts etc)			
(vi) Any other			
3. Cyclone / Tsunami			
A. Capture			

Marine			
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture	Not applicable	Not applicable	Not applicable
(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)			
(vi) Any other			
4. Heat wave and cold wave	Not applicable	Not applicable	Not applicable
A. Capture			
Marine			
Inland	No specific action is taken as it is a supporting activity only and fishes are collected from natural ponds, rivers only.		
B. Aquaculture	Not applicable	Not applicable	Not applicable
(i) Changes in pond environment (water quality)			
(ii) Health and Disease management			

(iii) Any other			
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^a based on forewarning wherever available



Coloured mulches in capsicum production



Drip irrigation & Mulch in apple



Capsicum seed production under blue mulch



Drip irrigation in pea



Black LDPE sheet lining



Flat stone pitching



Brick pitching



Round river boulder pitching

Lining and pitching of farm pond with different materials