

## State: Uttarakhand

### Agriculture Contingency Plan for District: Pauri Garhwal

1.0 District Agriculture profile				
1.1	<b>Agro-Climatic/Ecological Zone</b>	Western himalayan region		
	<b>Agro Ecological Sub Region (ICAR)</b>	Western Himalayan Warm Sub Humid Region		
	<b>Agro-Climatic Zone (Planning Commission)</b>	Western Himalayan Zone		
	<b>Agro Climatic Zone (NARP)</b>	Sub Temperate to Temperate		
	List all the districts or part thereof falling under the NARP Zone	Haridwar, Nainital, Almora, Bageshwar, Champawat, Pithoragarh, Pauri, Tehari, Uttarkashi, Dehradun, Chamoli, Rudraprayag		
	<b>Geographic coordinates of district headquarters</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Altitude</b>
		29 <sup>0</sup> 45'' to 30 <sup>0</sup> 15''	78 <sup>0</sup> 24'' to 79 <sup>0</sup> 23''	1000- 2500 m
	<b>Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS</b>	Dr. Atar Singh, Zonal Project Director, GT Road, Rawatpur, New Vikas Bhawan, Kanpur 0512-2550927 (O)		
<b>Mention the KVK located in the district</b>	Mr. Anshuman Singh (O/IC) Krishi Vigyan Kendra, Bharsar, UUHF, Pauri Garhwal (Uttarakhand) – 246 123			

1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset ( specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep)	1057	-	2 <sup>nd</sup> week of June	2 <sup>nd</sup> week of September
	NE Monsoon(Oct-Dec)	18	-	-	-
	Winter (Jan- March)	108	-	-	-
	Summer (Apr-May)	49	-	-	-
	Annual	1232	-	-	-

<b>1.3</b>	Land use pattern of the district (latest statistics)	Geographical area ('000 ha)	Cultivable area ('000 ha)	Forest area ('000 ha)	Land under non-agricultural use ('000 ha)	Permanent Pastures ('000 ha)	Cultivable wasteland ('000 ha)	Land under Misc. tree crops and groves ('000 ha)	Barren and uncultivable land ('000 ha)	Current Fallows ('000 ha)	Other fallows ('000 ha)
	<b>Area</b>	672.9	-	385.1	15.5	35.2	38.5	56.1	-	7.8	18.2

<b>1.5</b>	Agricultural land use*		<b>Area ('000 ha)</b>	Cropping intensity %
	Net sown area		78.486	
	Area sown more than once		32.432	
	Gross cropped area		110.875	
			141.26	

<b>1.6</b>	Irrigation	<b>Area ('000 ha)</b>		
	Net irrigated area	7.8		
	Gross irrigated area	14.6		
	Rainfed area			
	<b>Sources of Irrigation</b>	<b>Number</b>	<b>Area ('000 ha)</b>	<b>% of total irrigated area</b>
	Canals			
	Tanks			
	Open wells			
	Bore wells			
	Lift irrigation schemes			
	Micro-irrigation			
	Other sources (please specify)			
	Total Irrigated Area			
	Pump sets			
	No. of Tractors			
	<b>Groundwater availability and use* (Data source: State/Central Ground water Department /Board)</b>	<b>No. of blocks/ Tehsils</b>	<b>(%) area</b>	<b>Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)</b>
	Over exploited			
	Critical			
	Semi- critical			
	Safe			
Wastewater availability and use				
Ground water quality				
<b>*over-exploited: groundwater utilization &gt; 100%; critical: 90-100%; semi-critical: 70-90%; safe: &lt;70%</b>				

**1.7 Area under major field crops & horticulture**

1.7a	Major field crops cultivated**	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
1	Rice (kharif)			16.2					16.2
2	maize(kharif)			2.4					2.4
3	Finger millet (kharif)			26.6					26.6
4	Barnyard millet(kharif)			17.5					17.5
5	Black gram (kharif)			4.9					4.9
6.	Horse Gram/ kulth			2.0					2.0
7.	Back soybean (kharif)			0.2					0.2
8.	Arhar			0.4					0.4
9.	Amaranth			0.2					0.2
10.	Wheat						27.6		27.6
11.	Barley						6.8		6.8
12.	Lentil						1.3		1.3
13.	Rapeseed and mustard						2.0		2.0
14.	Pea						0.01		0.01
Others (specify)				-		-			

1.7b	Horticulture crops - Fruits	Area ('000 ha)		
		Total	Irrigated	Rainfed ('000 ha)
1	Apple	0.100		
2	Pear	0.090		
3	Peach	0.066		
4	Plum	0.070		
5	Apricot	0.011		
6	Walnut	0.178		
Others (specify)	Citrus	0.015		

<b>1.7c</b>	<b>Horticulture crops – Vegetables**</b>	<b>Total area ('000 ha)</b>
1	Pea	0.025
2	Reddish	0.035
3	French bean	0.025
4	Cabbage	0.024
5	Cauliflower	0.009
6	Onion	0.035
7	Okra	0.015
8	Tomato	0.034
9	Brinjal	0.012
10	Potato	0.100

<b>1.8</b>	<b>Livestock (in number)<sup>#</sup></b>	<b>Male ('000)</b>	<b>Female ('000)</b>	<b>Total ('000)</b>			
	Non descriptive Cattle (local low yielding)	-	-	351.412			
	Crossbred cattle	-	-	10.151			
	Non descriptive Buffaloes (local low yielding)	-	-	70.115			
	Graded Buffaloes	-	-	71.798			
	Goat	-	-	151.575			
	Sheep	-	-	34.007			
	Others (Camel, Pig, Yak etc.)	-	-	3.219			
Commercial dairy farms (Number)	-	-	-				
<b>1.9</b>	<b>Poultry</b>	<b>No. of farms</b>	<b>Total No. of birds ('000)</b>				
	Commercial	-	68.579				
	Backyard	-					
<b>1.10</b>	<b>Fisheries (Data source: Chief Planning Officer of district)</b>						
	<b>A. Capture</b>						
	<b>i) Marine (Data Source: Fisheries Department)</b>	<b>No. of fishermen</b>	<b>Boats</b>		<b>Nets</b>		<b>Storage facilities (Ice plants etc.)</b>
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
		-	-	-	-	-	-
	<b>ii) Inland (Data Source: Fisheries Department)</b>	<b>No. Farmer owned ponds</b>		<b>No. of Reservoirs</b>		<b>No. of village tanks</b>	
		-		-		-	
	<b>B. Culture</b>						
		<b>Water Spread Area (ha)</b>		<b>Yield (t/ha)</b>		<b>Production ('000 tons)</b>	
	<b>i) Brackish water (Data Source: MPEDA/ Fisheries Department)</b>	-		-		-	
<b>ii) Fresh water (Data Source: Fisheries Department)</b>	0.31		-		43.00		
<b>Others</b>	-		-		-		

\*\* Source State Agriculture Department Uttarakhand

**1.11 Production and Productivity of major crops (2012- 13)**

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
<b>Major Field crops (Crops to be identified based on total acreage)</b>										
	Rice	18.496	1142					18.496	1142	
	Maize	2.460	1020					2.460	1020	
	Finger millet	36.762	1385					36.762	1385	
	Barnyard millet	21.352	1221					21.352	1221	
	Black gram	4.050	822					4.050	822	
	Horse gram	1.185	586					1.185	586	
	Black soybean	0.174	967					0.174	967	
	Arhar	0.329	872					0.329	872	
	Amaranth	0.065	423					0.065	423	
	Wheat			36.938	1340			36.938	1340	
	Barley			8.437	1248			8.437	1248	
	Lentil			1.031	797			1.031	797	
	Rapeseed and mustard			1.070	523			1.070	523	
	Pea			0.008	667			0.008	667	
<b>Major Horticultural crops (Crops to be identified based on total acreage)</b>										
	Apple	0.300	30.00					0.300	30.00	
	Pear	0.330	36.66					0.330	36.66	
	Peach	0.049	7.42					0.049	7.42	
	Plum	0.150	21.42					0.150	21.42	
	Apricot	0.145	14.21					0.145	14.21	
	Walnut	0.100	5.61					0.100	5.61	
<b>Others</b>	<b>Citrus</b>			0.075	21.42			0.075	21.42	

<b>Vegetables**</b>										
	Pea			0.180	72.00			0.180	72.00	
	Reddish			0.230	65.71			0.230	65.71	
	French bean	0.170	68.00					0.170	68.00	
	Cabbage			0.180	75.00			0.180	75.00	
	Cauliflower			0.33	36.66			0.33	36.66	
	Onion			0.370	105.71			0.370	105.71	
	Okra	0.88	58.66					0.88	58.66	
	Tomato	0.530	155.88					0.530	155.88	
	Brinjal	0.110	91.66					0.110	91.66	
	Potato	0.1700	170.00					0.1700	170.00	

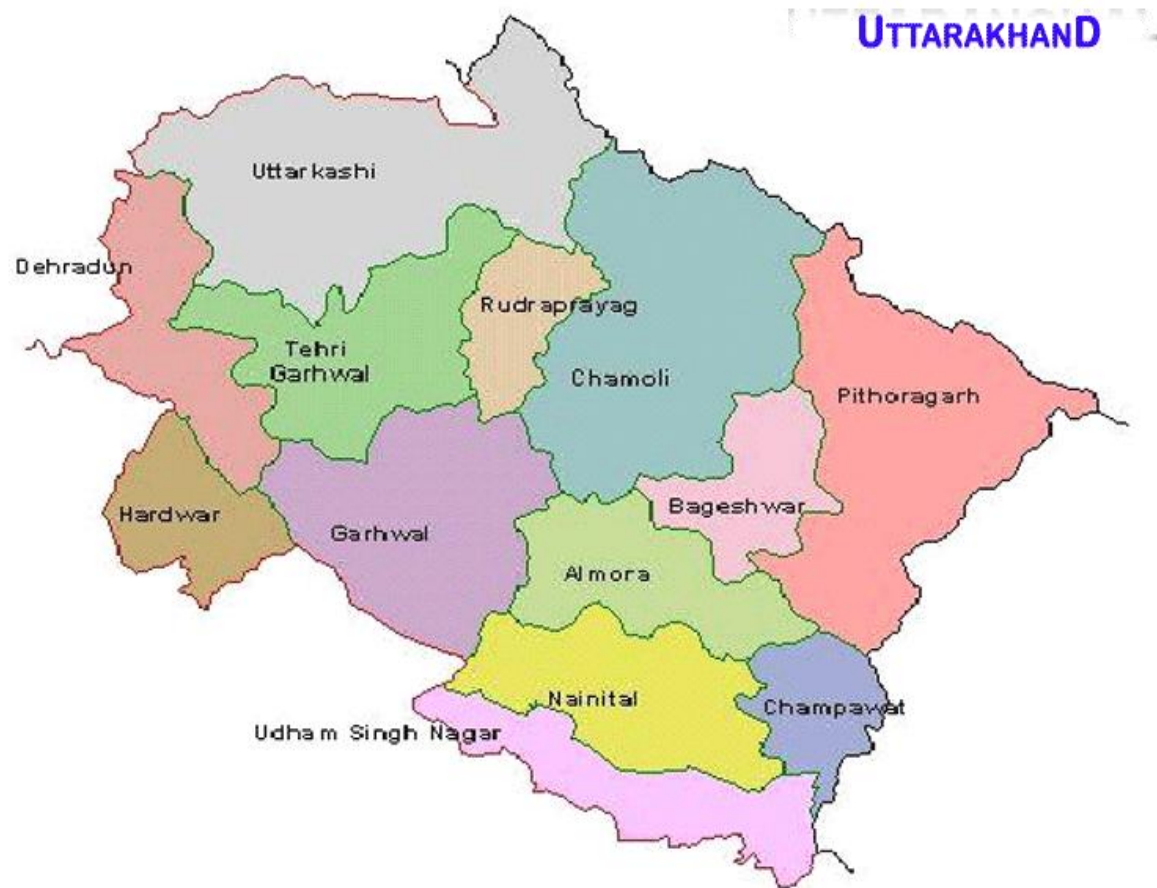
<b>1.12</b>	<b>Sowing window for 5 major field crops (start and end of normal sowing period)</b>	<b>Rice</b>	<b>Wheat</b>	<b>Finger millet</b>	<b>Barnyard millet</b>	<b>Rape seed mustard</b>
	Kharif- Rainfed	2 <sup>nd</sup> week of March – 2 <sup>nd</sup> week of April		1 <sup>st</sup> week of April – 2 <sup>nd</sup> week of April	4 <sup>th</sup> week of March – 2 <sup>nd</sup> week of May	
	Kharif-Irrigated	2 <sup>nd</sup> week of June – 2 <sup>nd</sup> week of July		1 <sup>st</sup> week of April – 3 <sup>rd</sup> week of April	1 <sup>st</sup> week of April – 3 <sup>rd</sup> week of May	
	Rabi- Rainfed		2 <sup>nd</sup> week of October – 2 <sup>nd</sup> week of November			2 <sup>nd</sup> week of October – 2 <sup>nd</sup> week of November
	Rabi-Irrigated	-	2 <sup>nd</sup> week of October – 2 <sup>nd</sup> week of November	-	-	2 <sup>nd</sup> week of November – 3 <sup>rd</sup> week of November.



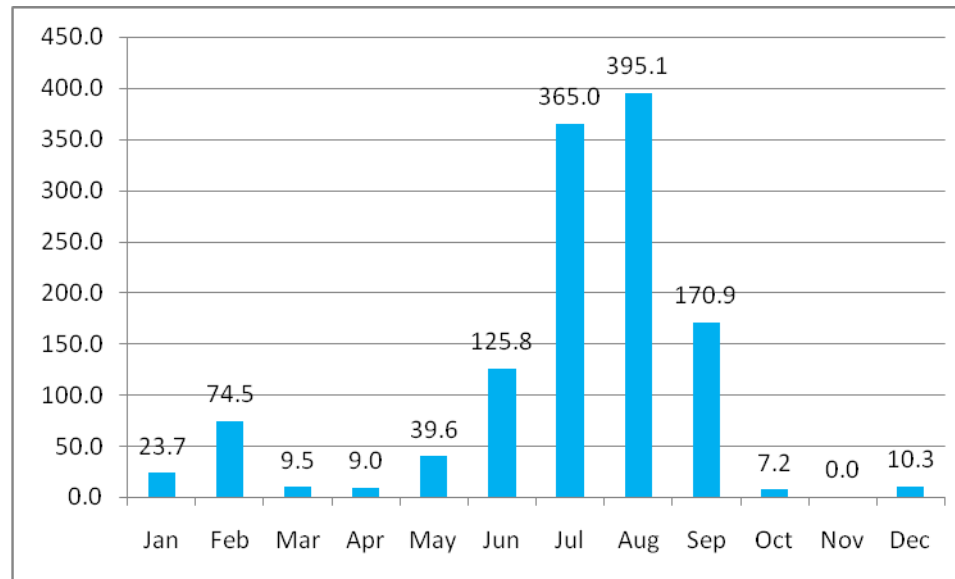
1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought		√	
	Flood			√
	Cyclone			√
	Hail storm		√	
	Heat wave			√
	Cold wave			√
	Frost	√		
	Sea water intrusion			√
	Pests and disease outbreak (specify)	√		
	Others (specify)			√

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

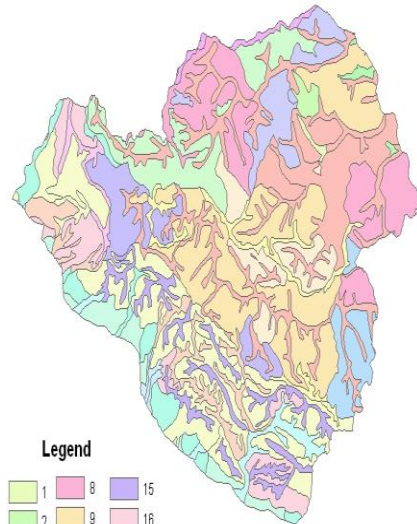
Annexure 01: Location of district Pauri Garhwal in the map of Uttarakhand state



**Annexure 02 : Mean annual rainfall (mm) of district Pauri Garhwal**



**SOILS  
PAURI DISTRICT  
UTTARAKHAND**



NBSS & LUP, Regional Centre Delhi

**Summits and Ridges (30-50% Slopes)**

1. Shallow, loamy soils, severely eroded and moderate stoniness associated with loamy-skeletal soils, severely eroded and moderate stoniness
2. Shallow, loamy-skeletal soils, severely eroded and moderate stoniness associated with sandy skeletal soils, severely eroded and moderate stoniness .
3. Medium deep, loamy soils, moderately eroded and strong stoniness associated with loamy skeletal soils and moderately eroded .

**Side Slopes (30-50% slopes)**

4. Shallow, loamy soils, very severely eroded and strong stoniness associated with loamy - skeletal, severely eroded and moderate stoniness .
5. Shallow, loamy soils severely eroded and strong stoniness associated with medium deep loamy soils, moderately eroded and moderate stoniness..
6. Medium deep, loamy-skeletal soils, moderately eroded and strong stoniness associated with shallow loamy soils, moderately eroded and moderate stoniness .
7. Medium deep, loamy-skeletal soils, moderately eroded associated with shallow loamy soils, severely eroded .
8. Medium deep, loamy soils, moderately eroded and moderate stoniness associated with medium deep, loamy soils .
9. Medium deep, loamy-skeletal soils, moderately eroded and moderate stoniness associated with medium deep, loamy soils, slightly eroded and moderate stoniness
10. Deep loamy soils and slightly eroded associated with loamy-skeletal soils and moderately eroded

**Fluvial Valley (3-5% slopes)**

11. Medium deep, loamy soils and moderately eroded associated with deep loamy soils.
12. Deep loamy soils and slightly eroded .

**Cliffs (>50% slopes)**

13. Rock outcrops associated with shallow, loamy soils, very severely eroded and strong stoniness .

**Shivaliks**

**Summits and Ridge Tops (30-50% slopes)**

14. Shallow, loamy soils severely eroded and moderate stoniness
15. Shallow, loamy-skeletal soils and moderately eroded associated with medium deep loamy soils, moderately eroded and moderate stoniness

**Side Slopes (30-50% slopes)**

16. Medium deep, loamy soils, moderately eroded, and moderate stoniness associated with shallow loamy-skeletal soils, moderately eroded and moderate stoniness.
17. Deep, loamy soils and slightly eroded associated with medium deep, loamy-skeletal soils and moderately eroded .

**Fluvial Valley (3-5% slopes)**

18. Deep, loamy soils and slightly eroded .

**Piedmont Plain (1-3% slope)**

19. Deep, stratified loamy (loamy over fragmental/sandy) and slightly eroded associated with sandy soils .
20. Deep, loamy soils and slightly to moderately eroded .

**Alluvial plain (0-1% slopes)**

21. Deep, loamy soils and slightly eroded

**Active Flood Plain (0-3% slope)**

22. Deep, sandy soils with moderate flooding associated with stratified loamy soils with slight flooding .

## 2.0 Strategies for weather related contingencies

### 2.1 Drought

#### 2.1.1 Rainfed situation

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agonomic measures	Remarks on Implementation
Early season drought (delayed onset)  Delay by 2 weeks July 2nd week	1. Upland (hill and forest soil)	Rice - Wheat	Cheti/Spring Rice (VL 206, VL207, VL 208, VL 209)  Wheat (VL Gehun 892, 907, 616, UP 2572)	Bunding of terraces Use of short duration varieties. timely weeding should be done to conserve moisture Addition of well decomposed organic manure during the time of field preparation Appropriate sowing method to conserve moisture, higher seed rate, addition of organic manures (FYM/Compost @ 5-10 t/ha), grow drought resistant variety Seed treatment with biofertilizers for better nutrient uptake	Supply of seeds through TDC, NSC Dept. of Agriculture and KVK
		Barnyard millet - Wheat	Barnyard millet-veg pea/lentil  Barnyard millet-Local, VL 29, VL 21, VL Madira 172, PRJ 1,2		

		Finger millet – Fallow Finger millet – pea Finger millet – lentil Finger millet – wheat	Finger millet+amaranth- lentil/wheat/toria  Finger millet (Local, VLM 146, VLM 149, VLM 315, VLM 324, PRM1, PRM 2), lentil (VL Mansoor 129), wheat (VL Gehun 892, 907, 616, UP 2572)		
	<b>2) Low Land Area (Coarse loamy soil)</b>	Rice – Wheat/ Wheat + Rape seed Mustard	No change in system In case of delay of monsoon grow crop using water from nearby source (Gadhera).	Use of short duration varieties. Gap filling, Use of organic manure at sowing, Timely weeding Conserve residual moisture for sowing rabi crops Life saving irrigation from the nearby sources (Gadhera)	Supply of seeds through TDC, NSC Dept. of Agriculture and KVK
	<b>3. Eroded Hill Soil (Mid Hills)</b>	Rice – Wheat	Cheti/Spring Rice (VL 206, VL207, VL 208, VL 209)	Incorporate legume, forage and fodder grasses and other deep rooted crops in the cropping system Grow erosion resistant crop like cowpea, urd, soybean, gahat etc Use of organic manure Cover the soil surface to minimize the soil loss through live, straw or plastic mulch Inward slope should be made during field preparation Grow Napier grass on the shoulder bunds All field preparation practices and line sowing of crops should be across the slope	Supply of seeds through TDC, NSC Dept. of Agriculture and KVK
		Barnyard Millet- Wheat	Barnyard millet-lentil Soybean -wheat/lentil Gahat/ricebean- wheat +toria		

		Finger millet - fallow	Finger millets +Black Soybean/Horsegram-Wheat Finger millet- lentil/vegetable pea		
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Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)	1. Upland (Hill and Forest Soil)	Rice-Wheat	Replace unirrigated chaiti rice with jethi rice varieties (VL Dhan 154, VL 221) Rice-wheat+ toria/mustard Rice- lentil	Late sowing of crop Increase the seed rate by 25% Make water available from the nearby sources for sowing Grow short duration variety and crop Application of well decompose organic manure or FYM Give life saving irrigation Replace some area through pulse crop as they withstand well in drought condition Gap filling	Supply of seeds through TDC, NSC Dept. of Agriculture and KVK
		Barnyard Millet- Wheat	Barnyard Millet- lentil/vegetable pea Gahat/ rajma/urd/moong-wheat Arhar-wheat/toria Pulse crop- wheat + toria/mustard Soybean/ricebean- wheat/lentil  Rice bean (PRR 1, PRR2)	Grow crop by giving life saving irrigation Manual weeding should be done to conserve the moisture Intercropping of grain crop with legume crops Seed treatment with biofertilizers for better nutrition to the plant	

		Finger millet-Fallow	Finger millet+gahat/ urd/moong-wheat+rai/mustard finger millet+Amaranth- lentil rice bean-wheat  Urd bean- PU 35, PU 19, Rajma (VL Rajma 63, 125), lentil (VL Mansoor-103, 125,126, 507,129), gahat (local var, VL Gahat- 1, 8, 10, 15, 19), arhar (VL Arhar-1), veg pea (Arkel, PSM-1,Vivek Matar-9,10,11) Amaranth (PRA 123, VL Chua 44)		
	<b>2) Low Land Area (Coarse loamy soil)</b>	Rice – Wheat/ Wheat + Rape seed Mustard	No change in system In case of delay of monsoon grow crop using water from nearby source (Gadhera)/ Life saving irrigation from the nearby sources If no water available then rotate the rice crop with pulse crop Urd/moong/rajmah/gahat/rice bean-lentil/ vegetable pea	Application of well decompose organic manure or FYM Transplant 45 days old seedlings of rice (3-4 seedlings/hill) Grow drought resistant varieties and intercrop grain crops with leguminous crops Gap filling and thinning where plants get more crowded Seed treatment with biofertilizers for better nutrition to the plant	
	<b>3. Eroded Hill Soil (Mid Hills)</b>	Rice - Wheat	Moog/urd/gahat/soybeen-wheat Moog/urd/gahat-wheat/lentil Finger millet-lentil/wheat Cow pea (Pusa komal)/ Rajma (VL-Rajma 63)-wheat+toria	Incorporate legume, forage and fodder grasses and other deep rooted crops in the cropping system Grow erosion resistant crop like cowpea, urd, soybean etc	Inward slope should be made during field preparation Grow napier grass and other erosion resistant grasses on



		Barnyard Millet- Wheat	Soybean-wheat Ricebean/gahat-wheat/lentil/toria	Use of organic manure Cover the soil surface to minimize the soil loss through live, straw or plastic mulch Live saving irrigation at critical stages	the shoulder bunds All field preparation practices and line sowing of crops should be done across the slope
		Finger millet - fallow	Grow nursery of finger millet then transplant it in main field as per the availability of water in up to the 1 <sup>st</sup> fortnight of July Transplanted finger millet- wheat Finger millet – wheat + toria Finger millet-lentil		
<b>Condition</b>			<b>Suggested Contingency measures</b>		
<b>Early season drought(delayed onset)</b>	<b>Major Farming situation</b>	<b>Normal Crop/cropping system</b>	<b>Change in crop/cropping system</b>	<b>Agronomic measures</b>	<b>Remarks on Implementation</b>
<b>Delay by 6 weeks</b>  <b>August 2nd week</b>	<b>1. Upland (Hill and Forest Soil)</b>	Rice-Wheat Barnyard Millet- Wheat Finger millet-Fallow	Iobia/gahat/ricebean-wheat/lentil Green Fodder, Radish (Pusa Chetki, Pusa Himani), Veg. French bean (Laxmi, Arka Komal), Cauliflower (Pusa Dipali, Improved Japani), Cabbage (Golden Acre/Pusa Mukta), Tomato (Palam Pink, Palam Pride), Coriander, Spinach	On the moisture availability basis late sowing of moong and urd could be done with short duration varieties Application of well decomposed organic manure Mulching and Weeding should be done properly If there are some water storage structure than go for live saving irrigation at critical crop growth stages Use of anti-transpirants Increase the seed rate Gap filling and thinning accordingly Use of biofertilizers for better nutrient availability	Supply of seeds through TDC, NSC Dept. of Agriculture and KVK  Anti transpirants can be provided for demonstration on crops.  Sprayers are supplied by Horticulture Deptt. on 50% subsidy to the farmers.  Mulch sheet and drip irrigation system, shadenets by the Distt. Horticulture Deptt.

	2. Low land Area (coarse loamy soil)	Rice - Wheat Rice-Wheat + rape seed mustard	lobia/gahat-wheat/lentil finer millet (fodder)-wheat/lentil Green Fodder, Radish (Pusa Chetki, Pusa Himani), Veg. French bean (Laxmi, Arka Komal), Cauliflower (Pusa Dipali, Improved Japoni), Cabbage (Golden Acre/Pusa Mukta), Tomato (Palam Pink, Palam Pride), Coriander, Spinach	Inclusion of leguminous crops in the cropping system Efficient management of water resources to minimize the water losses	
	3. Eroded hill Soil (Mid Hills)	Rice- Wheat Barnyard millet-Wheat Finger millet-Fallow	Follow pulse based cropping system  lobia/gahat-wheat/lentil maize (fodder)-wheat maize (fodder)-lentil/wheat+toria	Replace unirrigated chaiti rice with jethi rice varieties (VL Dhan 154, VL 221) Late sowing of barnyard millet with increased seed rate by 25% Application of well decomposed organic manure Grow short duration and drought resistant varieties Marginal bund should be properly made Grow erosion resistant crops as an intercrop with base crop	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
<p><b>Early season drought(delayed onset)</b></p> <p><b>Delay by 8 weeks</b></p> <p><b>August 4th week</b></p>	1. Upland (Hill and forest soil)	Rice - Wheat Barn yard millet- Wheat Finger millet- Fallow	<p>Radish (Pusa Chetki, Pusa Himani), Tomato (Palam Pink, Palam Pride, Solan Sindhur), Coriander, Spinach</p> <p>Toria (Bhawani), Spinach (Pusa Harit), Chinese cabbage (Palampur Green)</p> <p>Green fodder (Barley, oat)</p> <p>Wheat (VL-892, HPW-251), Barley (Vimal), Barley (HBL-276)</p> <p>Garlic : GHC 1 Fodder oats : Palampur-1 &amp; Kent</p>	<p>Crop is sown on moisture availability basis.</p> <p>Grow drought resistant crop varieties</p> <p>If prolonged drought condition occurs then grown crop can be used as fodder crop for live stocks due to poor yield</p> <p>Grow short duration moong crop as a catch crop in late kharif season</p> <p>Application of organic manure</p> <p>Application of anti-transpirants</p> <p>Use of biofertilizer</p> <p>If water storage tanks are there then go for life saving irrigation at critical stages</p> <p>Timely weeding should be done</p> <p>Mulching should be done</p> <p>Thinning should be done to reduce water loss</p>	<p>Supply of seeds through TDC, NSC Dept. of Agriculture and KVK</p> <p>Anti transpirants can be provided for demonstration on crops.</p> <p>Sprayers are supplied by Horticulture Deptt. on 50% subsidy to the farmers.</p> <p>Mulch sheet and drip irrigation system, shadenets by the Distt. Horticulture Deptt.</p>

	2. Low land Area (Coarse Loamy Soil)	Rice –Wheat Rice-Wheat + rape seed mustard	Where source of water available round then one can go for growing paddy timely sown and other pulse crop in the month of kharif  Radish (Pusa Chetki, Pusa Himani), Tomato (Palam Pink, Palam Pride, Solan Sindhur), Coriander, Spinach  Torla (Bhawani), Spinach (Pusa Harit), Chinese cabbage (Palampur Green)  Green fodder (Barley, oat)  Wheat (VL-892, HPW-251), Barley (Vimal), Barley (HBL-276)  Garlic : GHC 1 Fodder oats : Palampur-1 & Kent	Less effect of late occurrence of rain fall in irrigated area.	
	3. Eroded Hill Soil (Mid Hills)	Rice -Wheat Barnyard millet-Wheat Finger millet- Fallow	Kharif crop (paddy, finger and barnyard millet) harvested as fodder crop because poor grain setting due to lack of moisture. After kharif crop in the month of September sowing of toria and other legume crop of rabi season like pea, lentil.	Minimum soil disturbance to conserve the soil moisture. Drought resistant fodder crop should be taken.	

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)	1. Upland (Hill and Forest Soil)	Rice-Wheat Barnyard millet – wheat Finger millet - fallow	No change  After finger millet instead of fallow crops like lentil and toria to cover the soil surface and reduce water loss  If in case there is poor germination then gap filling should be done to maintain the plant population  Timely weeding to reduce water loss.	Addition of organic manures. Use of locally available mulching materials. Water conservation with low cost poly tanks.	Construction of rain water harvesting tanks under state funding schemes.
	2. Low land Area (Coarse loamy soil)	Rice -Wheat Rice –wheat + rape seed mustard	If in case there is poor germination then gap filling should be done to maintain the plant population  No change in system	Top dressing of nitrogen	
	3. Eroded hill Soil (Mid Hills)	Rice-Wheat Barnyard millet-Wheat Finger millet- fallow	Life saving irrigation at critical stages  If in case there is poor germination then gap filling should be done to maintain the plant population  Other than fallow crops like lentil, pea, toria can be grown	Application of organic manure.  Use of locally available mulching materials.	Construction of rain water harvesting tanks under state funding schemes.

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage	1. Upland (Hill and Forest Soil)	Rice – Wheat Barnyard Millet – Wheat Finger millet - Fallow	<p>Application of organic manure during the time of field preparation to hold moisture during the time of rainfall</p> <p>Line sowing across the slope to reduce the flow of water which will give more time for interception</p> <p>Mid season correction (thinning within the row and between the row ) Remove every third row</p> <p>Organic mulches/grass mulching. In situ water conservation with low cost poly tanks for harvesting normal onset</p> <p>Timely weeding to reduce the water loss through transpiration.</p> <p>Use of anti-transpirants</p> <p>Life saving irrigation if available</p>	<p>Foliar spray of nitrogen with 1% of urea solution.</p> <p>Thinning to minimize the plant population to conserve soil moisture.</p> <p>Spray of potassium</p>	
	2. Low Land Area (Coarse Loamy soil)	Rice- Wheat Rice- Wheat + Rape seed mustard	<p>Timely weeding</p> <p>Use of anti-transpirants</p> <p>Life saving irrigation if available</p>	<p>Rain water harvesting. Life saving irrigation.</p>	

	3. Eroded Hill Soil (Mid Hills)	Rice –Wheat Barnyard millet- Wheat Finger Millet- Fallow	Intercrop with pulse crop  Line sowing across the slope to reduce the water flow which will give more time for interception	Rain water harvesting.	
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Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell)					
At flowering/ fruiting stage	1. Upland (Hill and Forest Soil)	Rice –Wheat  Barnyard millet – Wheat  Finger millet- fallow	<p>Crop should be harvested( matured panicle should be harvested and immature should be left and those can be used as fodder)</p> <p>Life saving irrigation at critical stages through water storage structure (if available)</p> <p>Mulching should be done</p> <p>Weeding should be done.</p> <p>Water sprayings with conserved water,</p> <p>Remove 3-4 basal leaves of the crop in case of early stoppage of rain, spraying of 2% urea and recommended concentration of other plant nutrient to take the advantage of favourable conditions</p> <p>Anti-transpirant spray</p>	Supplementary irrigation through water harvesting tanks.	MNREGA – tank should be constructed, trench digging for water conservation.

			Salicylic acid spray to induce earliness Harvesting at physiological maturity		
	2. Low Land Area (Coarse Loamy Soil)	Rice –Wheat Rice –Wheat+ Rape Seed mustard	Application of organic manure Harvesting at physiological maturity  Seed setting is too poor then crop can be harvested as fodder for animals.	Foliar spray of nitrogen (1% urea solution)	Rain water harvesting tank should be constructed.
	3. Eroded hill Soil (Mid Hills)	Rice -wheat Barnyard millet-Wheat Finger millet-Fallow	Application of organic manure Harvesting at physiological maturity  Seed setting is too poor then crop can be harvested as fodder for animals. Nutrients applications should be made on the basis of moisture availability.	2 <sup>nd</sup> Nitrogen application should be delayed	Rain water harvesting tank should be constructed.



Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought (Early withdrawal of monsoon)	1. Upland (Hill and Forest Soil)	Rice – Wheat Barnyard millet – Wheat Finger millet- fallow	Terminal drought stress at the time of critical stage the give life saving irrigation from stored water tank (if available)  Mulching should be done to reduce water losses  Grains remain chaffy then crop is harvested as fodder for animals  Salicylic acid spray to induce earliness	Delay sowing of Rabi crops according the moisture availability. Grow short duration crop varieties. Opt for short duration varieties  Irrigate the crop at critical stages if there is availability of stored water	MNREGA- tank should constructed trench digging for water conservation.
	2. Low Land Area (Coarse Loamy Soil)	Rice – Wheat Rice – Wheat+ rape seed/ mustard	Picking of lower and older leaves to reduce transpiration	Life saving irrigation at critical stage	
	3. Eroded hill Soil (Mid Hills)	Rice – Wheat Barnyard millet-Wheat Finger millet-Fallow	Terminal drought stress at the time of critical stage the give life saving irrigation from stored water tank (if available)  Mulching should be done to reduce water losses  In those areas follow pulse based cropping system as an intercrop or sole crop	Delay sowing of Rabi crops according the moisture availability. Grow short duration crop varieties. Opt for short duration varieties  Irrigate the crop at critical stages if there is availability of stored water	

**2.1.2 Drought - Irrigated situation: NA**

Condition	Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures
Delayed release of water in canals due to low rainfall	Not Applicable			
Limited release of water in canals due to low rainfall	Not Applicable			
Non release of water in canals under delayed onset of monsoon in catchment	Not Applicable			
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Not Applicable			
Insufficient groundwater recharge due to low rainfall	Not Applicable			

**2.2.5 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	Flowering stage	Crop maturity stage	Post harvest
<b>Rice</b>	Drainage channels should be made during the time of field preparation for proper drainage in case of high rainfall Good for unirrigated rice but proper drainage management practices should be followed in case of irrigated rice	Good for unirrigated rice but proper drainage management practices should be followed in case of irrigated rice Drainage channels should be cleaned for better drainage	Drainage channels should be made during the time of field preparation and in case of very heavy rainfall harvest the crop at physiological maturity and dry the grains properly	Shift to safe place dry in shade and turn frequently
<b>Finger millet</b>	Drainage channels should be made during the time of field preparation for proper drainage in case of high rainfall	Drainage channels should be cleaned for better drainage	Drainage channels should be made during the time of field preparation and in case of very heavy rainfall harvest the crop at physiological maturity and dry the grains properly	Shift to safe place dry in shade and turn frequently
<b>Barnyard millet</b>	Drainage channels should be made during the time of field preparation for proper drainage in case of high rainfall	Drainage channels should be cleaned for better drainage	Drainage channels should be made during the time of field preparation and in case of very heavy rainfall harvest the crop at physiological maturity and dry the grains	Shift to safe place dry in shade and turn frequently

			properly	
<b>Green gram</b>	Drainage channels should be made during the time of field preparation for proper drainage in case of high rainfall	Drainage channels should be cleaned for better drainage	Drainage channels should be made during the time of field preparation and in case of very heavy rainfall harvest the crop at physiological maturity and dry the grains properly	Shift to safe place dry in shade and turn frequently
<b>Black gram</b>	Drainage channels should be made during the time of field preparation for proper drainage in case of high rainfall	Drainage channels should be cleaned for better drainage	Drainage channels should be made during the time of field preparation and in case of very heavy rainfall harvest the crop at physiological maturity and dry the grains properly	Shift to safe place dry in shade and turn frequently
<b>Pigeon pea</b>	Drainage channels should be made during the time of field preparation for proper drainage in case of high rainfall	Drainage channels should be cleaned for better drainage	Drainage channels should be made during the time of field preparation and in case of very heavy rainfall harvest the crop at physiological maturity and dry the grains properly	Shift to safe place dry in shade and turn frequently
<b>Wheat</b>	Good as it is grown under unirrigated condition Drainage channels should be made during the time of field preparation for proper drainage in case of high rainfall	Good as it is grown under unirrigated condition Drainage channels	Drainage channels should be made during the time of field preparation and in case	Shift to safe place dry in shade and turn frequently

		should be cleaned for better drainage	of very heavy rainfall harvest the crop at physiological maturity and dry the grains properly	
<b>Rapeseed and mustard</b>	Drainage channels should be made during the time of field preparation for proper drainage in case of high rainfall	Drainage channels should be cleaned for better drainage	Drainage channels should be made during the time of field preparation and in case of very heavy rainfall harvest the crop at physiological maturity and dry the grains properly	Shift to safe place dry in shade and turn frequently
<b>lentil</b>	Drainage channels should be made during the time of field preparation for proper drainage in case of high rainfall	Drainage channels should be cleaned for better drainage	Drainage channels should be made during the time of field preparation and in case of very heavy rainfall harvest the crop at physiological maturity and dry the grains properly	Shift to safe place dry in shade and turn frequently
<b>Horticulture</b>				
Tomato	Make drainage channel, Ridges and top dressing of N	Improve drainage, spraying of micro nutrients. Avoid water stagnation in the field.	Improve drainage, spraying of micro nutrients. Avoid water stagnation in the field.	Store the produce under shed.
Potato	Drainage, N top dressing, earthing up	Drainage, removing weeds and older leaves for proper aeration	Removing (halms (upper portion))	Keep produce at dry place but not in heap
Cabbage	Avoid water stagnation in the field. Make drainage channel, Top dressing of N, Spraying of	-	Improve drainage, Avoid water stagnation	Keep produce at dry place but not in heap

	Borax			
French bean	Improve drainage	Avoid water stagnation in the field	Remove excess water	Keep produce at dry place but not in heap
Vegetable pea	Make drainage channel, Avoid water stagnation.	Make drainage channel, Avoid water stagnation, spraying of micro-nutrients.	Remove excess water	Keep produce at dry place but not in heap
Apple	Remove excess water	Spraying of micro nutrient/PBRs to improve fruit set	Spraying of micro nutrient/PBRs to improve yield and quality	Store at cool, dry, ventilated place, avoid heaping, package in wooden boxes
Peach	Remove excess water	Spraying of micro nutrient/PBRs to improve fruit set	Spraying of micro nutrient/PBRs to improve yield and quality	Store at cool, dry, ventilated place, avoid heaping, package in wooden boxes
Citrus	Remove excess water	Spraying of micro nutrient/PBRs to improve fruit set	Spraying of micro nutrient/PBRs to improve yield and quality	Store at cool, dry, ventilated place, avoid heaping
<b>Outbreak of pests and diseases due to unseasonal rains</b>				
Rice and Finger millet	<b>Brown plant hopper</b> : Drain the water before use of insecticides and direct the spray towards the base of the plants with monocrotophos @ 1250ml/ha or acephate 500 g/ha <b>Stem Borer</b> : Prolonged moist and humid condition leads to outbreak, Spray Cartap hydrochloride @ 25kg/ha	<b>Blast of rice and finger millet:</b> Spray after observing initial infection of the disease with carbendazim/ kitazin/ tricyclazole. <b>Brown plant hopper</b> : Drain the water before use of insecticides and direct the spray towards the base of the plants. monocrotophos @ 1250 ml/ha or acephate 500 g/ha	<b>False smut in rice and finger millet:</b> Spray cuprous hydroxide @ 0.25% <b>Stem Borer:</b> Spray Cartap hydrochloride 25 kg/ha	Store the grains at a moisture level below 14%
<b>Horticulture</b>				
Vegetable pea	Wilt in water logged patches : -Proper drainage facility	Powdery mildew: -spray any sulphur	Field drainage	-

	-Soil drenching with carbendazim @ 1.0 g/l at the base of plants	fungicide prior or after flowering Pod borer - Spray Dimethoate @ 1ml/ lt water		
Potato and tomato	Late blight: Removal of lower leaves of the plant -Earthing up of soil	Removal of lower leaves of the plant -Earthing up of soil -Preventive sprays of mancozeb @ 0.25%	Removal of lower leaves of the plant -Earthing up of soil -Preventive sprays of mancozeb @ 0.25% or curative sprays of Ridomil MZ @ 0.02%	-
Apple	Apple scab : Recommended schedule for the control of Apple scab White root rot : Drain out excess water from the basin and drench the basin with carbendazim 200g, or copper oxychloride 600g/200 lt water (3-4 time at an interval of 15-20 days)	Blossom thrips – Spray monocrotophos/dimethoate Powdery Mildew – Spray karathane @ 0.05% Scab: Spray Dodine	Brown rot – Spray mancozeb @ 0.025%	Proper CA storage and immediate transportation to market /godown
Citrus	Aphid, leaf minor - Spray metasystox/dimethoate			Green and blue mould rots- Proper CA storage

### 2.3 Floods : Not experienced / encountered

Condition	Suggested contingency measure <sup>o</sup>			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation <sup>1</sup>				
Horticulture	Not applicable			
Continuous submergence for more than 2 days	Not applicable			
Sea water intrusion	Not applicable			

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

Extreme event type	Suggested contingency measure <sup>r</sup>			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
<b>Heat Wave</b>	Not applicable			
<b>Cold wave</b>	Not applicable			
<b>FROST</b>				
Wheat	Light irrigation, smoke	Light irrigation, smoke	-	-
Potato	Light irrigation, smoke	Light irrigation, smoke	-	-
Cabbage	Light irrigation, smoke	Light irrigation, smoke	-	-
Vegetable pea	-	Light irrigation, smoke	-	-
Malta	Light irrigation, smoke	Light irrigation, smoke	-	-
<b>Hailstorm</b>				
Wheat	-	Direct sowing of Chaiti Dhan if wheat crop completely destroyed	-	-
Rice	Retransplanting and gap filling as per severity	-	-	-
Tomato	-	Anti hail net	Anti hail net	-
Apple	-	-	Anti hail net	-
Peach	-	-	Anti hail net	-
Malta	-	-	Anti hail net	-
<b>Cyclone</b>	Not applicable			



## 2.5 Contingent strategies for Livestock, Poultry & Fisheries

### 2.5.1 Livestock

	Suggested contingency measures		
	Before the event <sup>s</sup>	During the event	After the event
<b>Drought</b>			
<b>Feed and fodder availability</b>	Increasing area under fodder production; Collect crop residues, and tree fodder to store at safe place, Use mangers, chaff cutters , hay storage.	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.	Availing Insurance, culling undesirable Livestock; Raising of fodder trees, replacement of unproductive animals with improved ones
<b>Drinking water</b>	Storage of water in tanks , Traditional water ponds , rivers	Utilization of stored water, Stall drinking , rivers , traditional water ponds	Rejuvenation of water sources
<b>Health and disease management</b>	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
<b>Floods</b>	-	-	-
<b>Feed and fodder availability</b>	Not Applicable		
<b>Cyclone</b>	Not Applicable		

<b>cold wave</b>			
<b>Shelter/environment management</b>	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 & 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
<b>Health and disease management</b>	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 <sup>a</sup>	During the event	After the event	
<b>Drought</b>				
<b>Shortage of feed ingredients</b>	Surplus storage of poultry feed ; No special preparations these are kept as backyard activity	Utilization of surplus feed; No impact as these are 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
<b>Drinking water</b>	Storage of water in tanks	Utilize stored water	Kept as backyard activity	Water storage structures can be constructed in collaboration with MNERAGA
<b>Health and disease management</b>	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
<b>Floods</b>	Not Applicable			
<b>Shortage of feed ingredients</b>	-	-	-	-
<b>Drinking water</b>	-	-	-	-
<b>Health and disease management</b>	-	-	-	-
<b>Cyclone</b>	Not Applicable			

<b>Shortage of feed ingredients</b>	Not applicable			
<b>Drinking water</b>	Not applicable			
<b>Health and disease management</b>	Not applicable			
<b>Heat wave and cold wave</b>				
<b>Shelter/environment management</b>	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	-
<b>Health and disease management</b>	Local	Local and Veterinary care	Kept as backyard activity	-