

State: HIMACHAL PRADESH
Contingency plan for the district: Kangra

1.0	District Agriculture profile			
1.1	Agro-Climatic/Ecological Zone	Western Himalayas, Warm Subhumid (To Humid With Inclusion Of Perhumid) Eco-Region. (14.3)		
	Agro-Climatic Region (Planning Commission)	Western Himalayan Region (I)		
	Agro Climatic Zone (NARP)	Sub-Mountain and low hills sub-tropical zone (HP-1)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Southern part of Chamba, Una (Hamirpur), Solan, Bilaspur, Nahan, Kullu (S. Part), and Dharamshala (S. Part), Dharamshala, Mandi, Shimla & Bilaspur		
	Geographic coordinates of district	Latitude	Longitude	Altitude (m)
		30° 05' N* To 31° 2' N	75° 13' E To 75° 45' E	250-6975 metres
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRTTS	<ul style="list-style-type: none"> • Scientist In-charge Shivalik Agricultural Research & Extension Centre, Kangra HP 176 001 Phone: 01892 265685 Fax: 01892 264550 • Scientist In-charge, RWRC, Malan, 176047 • Associate Director, Jachh, Tehsil Nurpur, Distt. Kangra • Scientist In-charge, Mango and Litchi Farm, Nagrota Bagwan, 176 047 • Director of Research, CSKHPKV, Palampur Phone:01892 230406 		
	Mention the KVK located in the district with address	Krishi Vigyan Kendra, Kangra (HP).Himachal Pradesh 176001 Phone 01892-264550(O), Email: kvkkangra@yahoo.com		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	Agronomist Department of Agronomy, Forages and Grassland Management Palampur 176 062, CSKHPKV Palampur		

Source: District Agriculture Plan, Kangra, Himachal Pradesh Volume-IV Department of Agriculture (H.P.) consulting agency CSK Himachal Pradesh Agricultural University Palampur-176 062

1.2	Rainfall – (since 2006 - 2012)	Average (mm)	Normal onset	Normal cessation
	SW monsoon (June – Sep)	1216	4 th week of June to 1 st week of July	2 nd week of Sept
	NE Monsoon (Oct – Dec)	54.4	2 nd week of December	4 th week of December
	Winter (Jan – Feb)	127		

Summer (March – May)	143		
Annual	1539		

1.3 Land use pattern of the district - Area ('000 ha)**

Total Geographical Area	Net area sown	Forests	Land under non-agricultural uses	Permanent Pastures and other grazing land	Culturable waste	Land under misc. tree crops, etc.	Barren and unculturable land	Current fallows	Other fallows
577.7	116.3	231.7	77.7	87.8	27.4	8.5	16.3	11.0	1.1

** Source: Statistical outline of Himachal Pradesh, 2008-09

1.4 Major Soils of Kangra district of Himachal Pradesh*

1.4	Descriptions	Percent (%) of total area
1	Medium deep to deep, loamy-skeletal soils	23.3
2	Deep, loamy soils	21.1
3	Shallow, loamy-skeletal soils	12.5
4	Medium deep to deep loamy soils	10.1
5	Shallow, loamy soils	10.0
6	Shallow to medium deep, loamy soils	6.4
7	Rock outcrops with shallow, sandy-skeletal soils	3.5
8	Rock outcrops with shallow, loamy-skeletal soils	3.4
9	Rock outcrops with deep, loamy-skeletal soils	2.6
10	Shallow, sandy soils	2.2
11	Deep, loamy-skeletal soils	1.8
12	Rock outcrops with medium deep, loamy-skeletal, calcareous soils	1.2
13	Deep, sandy soils with	0.7
14	Shallow to medium shallow, loamy soils	0.6

15	Medium to deep, loamy, calcareous soils	0.5
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(data source: Soil Resource Maps of NBSS & LUP, estimated values)

1.5	Agricultural land use*	Area ('000 ha)	Cropping intensity %
	Net sown area	116.3	184%
	Area sown more than once	97.6	
	Gross cropped area	213.9	

*Source: District Agriculture Plan, Kangra, Himachal Pradesh Volume-IV Department of Agriculture (H.P.) consulting agency CSK Himachal Pradesh Agricultural University Palampur-176 062

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	35.6		
	Gross irrigated area	66.5		
	Rain fed area	107.2 (69.4% of total cultivable area, 154.417)		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals	3	5.4	34.1
	Tanks	141	0.3	2.3
	Tube wells	156	1.7	10.8
	Bore wells			
	Other wells			
	Lift irrigation schemes	77	2.2	14.4
	Micro-irrigation			
	Other sources :	37	0.2	1.3
	Kuhls	88	5.8	36.7
	Khattris (man-made water storage in rocky caves)			
	Total Irrigated Area		15.8	
	Pump sets			
	No. of Tractors		149.7**	
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks	(%) area	Quality of water
	Over exploited			
Critical				
Semi- critical				

	Safe		Ground water is of good quality
	Wastewater availability and use		
	Ground water quality	Good, EC<750m mhos/cm at 25 ⁰ C	
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%			

*Source: District Agriculture Plan Kangra Himachal Pradesh Volume-IV Department of Agriculture (H.P.), Consulting agency CSK Himachal Pradesh Agricultural University Palampur-176 062

1.7 Area under major field crops & horticulture

Sr. No.	Major field crops cultivated	Total Area ('000 ha)	
	Wheat	91.8	
	Maize	58.7	
	Paddy	37.1	
	Barley	2.6	
	Pulses		
	i. Black Gram	2.2	
	ii. Gram	1.04	
	iii. Others	2.07	
	Oil seeds		
	i. Toria	0.75	
	ii. Sesame	0.92	
	iii. Sarson	4.08	
	iv. Linseed	0.21	
	Horticultural		
		Total Area ('000 ha)	% Area
	Mango	10.5	47.3
	Citrus	5.6	25.5
	Litchi	1.5	6.9
	Guava	0.5	2.4
	Peach	0.2	1.2
	Papaya	0.2	1.0
	Vegetables		
	Tomato	3.2	32.9
	Cucurbits	2.02	20.5
	Okra	1.6	16.9
	Onion	0.6	7.0

	Cauliflower	0.4	4.5
	Peas	0.4	4.4
	Beans	0.4	4.4
	Brinjal	0.3	3.5
	Cabbage	0.3	3.5
	Capsicum	0.2	2.6
Others			
	Garlic	0.4	96.0
	Ginger	0.02	4.0
	Total Spices	0.4	100

*Source: District Agriculture Plan, Kangra, Himachal Pradesh Volume-IV Department of Agriculture (H.P.) consulting agency CSK Himachal Pradesh Agricultural University Palampur-176 062

1.8	Livestock	Number ('000)
	Type of animals	
	Crossbred cows	199.5
	Local cows	80.1
	Total Cattle	405.8
	Buffaloes	175.6
	Goats	326.7
	Sheep	247.4
	Others	54.9
	Total Livestock	1210.4
1.9	Poultry	123.5

*Field survey 2007-08 Source: District Agriculture Plan, Kangra, Himachal Pradesh Volume-IV Department of Agriculture (H.P.) consulting agency CSK Himachal Pradesh Agriculture University Palampur-176062

1.10	Inland Fisheries *	Water Spread Area ('000 ha)	Yield (t/ha)	Production ('000 t)
	i) Brackish water			
	ii) Fresh water			
	Total area estimated	4.1	Not available	0.9
	Fish species	Mahsheer, Singhara, Rohu, Catla, Mori, Mrigal, Common carp, Silver carp, Grass carp, Snow trout, snake head murrels, Mastacembelus, Loaches, Puntius, Barilius, Garra, Crossochielus, Danio, Brachydanio and Glyptothorax		

* Source: District Agriculture Plan Kangra Himachal Pradesh Volume-IV Department of Agriculture (H.P.) consulting agency CSK Himachal Pradesh Agricultural University Palampur-176 062

1.11 Production and Productivity of major crops

Name of crop	<i>Kharif</i>		<i>Rabi</i>	
	Production* ('000MT)	Productivity (kg/ha)	Production ('000MT)	Productivity (kg/ha)
Cereals				
Maize	91.9	1567		
Rice	48.7	1313		
Wheat			165.5	1803
Barley			3.4	1327
Fruits				
Mango	278417	26.4		
Citrus			119.08	20.9
Litchi	20.1	13.1		
Guava	7.9	17.8		
Peach	17.5	65.1		
Papaya	10.08	44	Both during <i>Kharif</i> and <i>rabi</i>	
Other fruits	14.07	4.03		
Vegetables				
Tomato	3.1	196.8		
Cucurbits	2.02			
Okra	1.6	133		
Onion	-		0.6	
Cauliflower	-	0.4		
Peas	-		0.4	50.5
Potato	4.9	175		

* Source: District Agriculture Plan Kangra Himachal Pradesh Volume-IV Department of Agriculture (H.P.) consulting agency CSK Himachal Pradesh Agricultural University Palampur-176 062

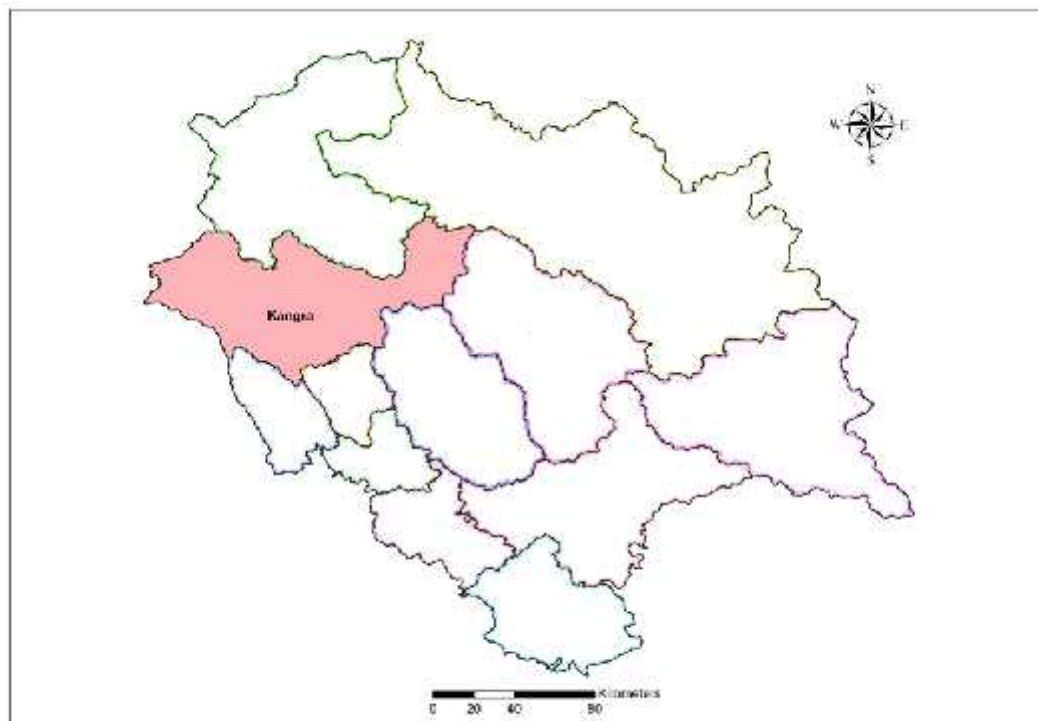
1.12	Sowing window for 5 major field crops	Maize	Paddy	Wheat	Sarson	Barley
	<i>Kharif</i> - Rain fed	3 rd week of May – 3 rd week of June	3 rd week of May – 3 rd week of June	-		
	<i>Kharif</i> -Irrigated	Not applicable	3 rd week of May-	-		

		2 nd week of June			
<i>Rabi</i> - Rain fed	-		1 st week of October to 4 th week of December	1 st week of October to 2 nd week of October	3 rd week of October to 2 nd week of November
<i>Rabi</i> -Irrigated	-		1 st week of November to 4 th week of December	-	

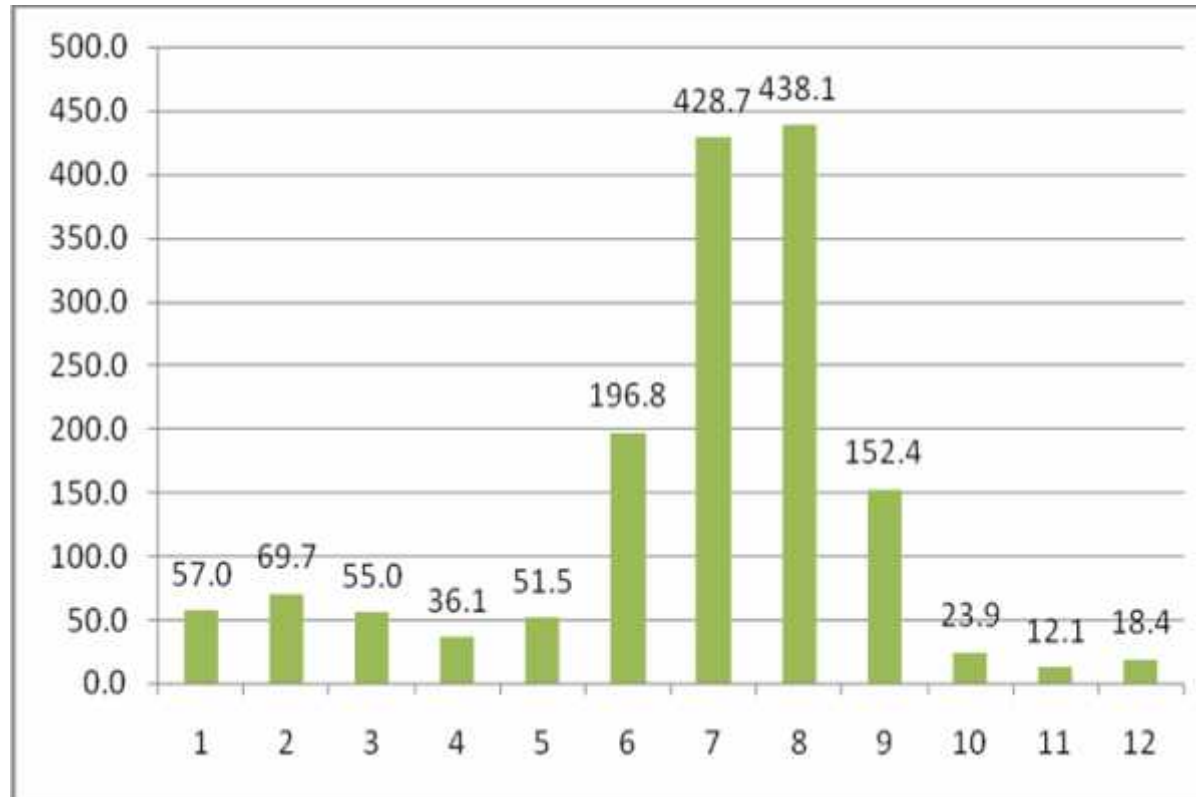
What is the major contingency the district is prone to?	Regular	Occasional	None
Drought	✓ (May-June)		
Flood			✓
Cyclone			✓
Hail storm		✓ (Sep) & (May)	
Heat wave	✓ (May-June)		
Cold wave	✓ (Jan- Feb)		
Frost	✓ (Dec- Feb)		
Sea water intrusion			✓
Pests and disease outbreak	Fruit fly of guava, mango, and cucurbits , rice leaf folder, potato tuber moth, litchi mite, leaf hopper and mealy bug in mango, mustard aphid, citrus nematode, nematodes in vegetables, brinjal fruit borer, tomato fruit borer , termite in rainfed crops sudden wilt and powdery mildew of cucurbits, yellow rust and loose smut of wheat, early blight and bacterial wilt of potato, false smut, blast and bacterial blight of rice, bacterial stalk rot of maize and bacterial wilt of capsicum, bacterial wilt and early blight of tomato, yellow mosaic virus and damping off of okra, citrus canker and red rust of litchi, powdery mildew and leaf minor of peas	Rice stem borer, rice hispa, wheat aphid, cabbage butter fly and maize stem borer, fruit borers and jassids of okra, aphids and white fly of cole crops, leaf sheath blight of maize, late blight of potato, covered smut of barley, alternaria blight and white rust of mustard, downy mildew of cucurbits, stalk rot of cole crops, bacterial wilt and phytophthora blight in solanaceous crops	

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 II	Enclosed: Yes
		Soil map as Annexure III	Enclosed: Yes

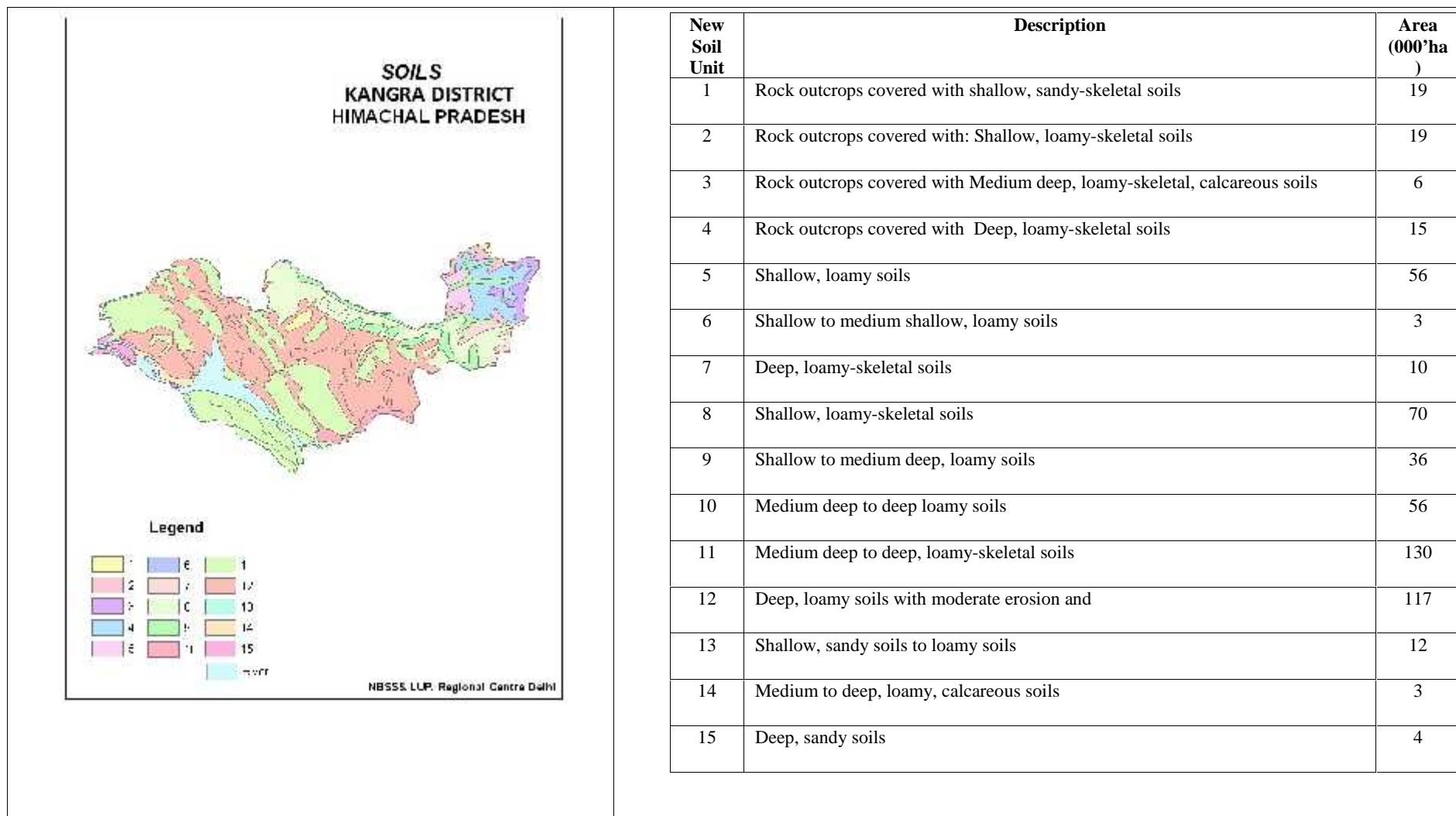
Annexure-I



Annexure-II



Annexure-III



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rain fed situation

Condition	Suggested Contingency measures				
Early season drought (delayed onset)	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 2 weeks Normal onset 20 th June ± 10 days 1 st week of July	Upland Rain-fed Loamy, coarse, loamy skeletal deep to medium deep soils	Rice (Transplanted/Direct seeded) HRI 152 Hybrid) HPR 1068/HPR 2143/ Kasturi Basmati/ Hassan Serai/ RP 2421/HPR 1156 In Kullu areas- Kunjan-4/Brighu Dhan/ Naggarr Dhan Direct sown: HPR 1156/ VL Dhan 221	1. Rice direct seeded/transplanted Rice: Transplanted- RP 2421/ HPR 1156/ HPR 1068 Direct sown: HPR 1156/ VL Dhan 221/	Spacing 15 cm x 15 cm in rice and planting 3-4seedlings/hill in normal rice Follow SRI technique if nursery can be raised elsewhere with assured water	Seed available with Agriculture department and may be promoted to purchase the same and being made available through RKVY also
			Bajaura Makka/ Vivek 21/ Girija and Early composite Baby corn(VL78/Early composite)	Sowing on ridges to avoid asphyxiation in paddy fields	
		Maize: HQPM 1/PMZ 4/Bajaura Makka/ Vivek 21/ Girija and Early composite	Maize short duration/baby corn Short duration Bajaura Makka/ Vivek 21/ Girija and Early composite	Stale seed bed preparation to avoid weeds Sowing on ridges with onset of rains	

			<p>Intercropping of oilseed & pulses in maize</p> <p>Maize + Soybean (Harit Soya/ Shivalik)</p> <p>Cowpea(C475) Blackgram (UG218/Him Mash-1) Sesame (LTK-4/Punjab Til No 1)</p> <p>Tomato Varieties:. Solan Garima/Solan Sindhur/Palam Pink/ Palam Pride</p>		
<p>(Normal onset of winter rains 20th December ±31 days)</p> <p>Onset by 1st week of January</p>		<p>Wheat Early sown (upto 15th October): VL 829, Timely (Upto 15th November): HPW 155, VL 907,804,832, HS 507, HPW 236, HPW 211 etc. Late sown: VL 892, HS 420</p>	<p>Wheat late sown varieties/oats Varieties for late sown conditions viz VL 892 , HS 490, HPW 42. Oats: PLP 1 (fodder)</p>	<p>Increase seed rate by 25% and fertilizer dose 125% for late sown with rains</p>	<p>Seed available with Agriculture department and may be promoted through RKVY/seed village etc and sowing in MANREGA</p>
		<p>Intercropping in wheat</p>	<p>Wheat + Mustard(RCC4) in 100+20% ratio</p>		

Condition	Suggested contingency measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					

<p>Delay by 4 weeks</p> <p>3rd week of July</p>	<p>Upland Rain-fed</p> <p>Loamy, coarse, loamy skeletal deep to medium deep soils</p>	<p>Rice (Transplanted/ Direct seeded)</p>	<p>Rice direct seeded : VL Dhan 221, RP 2421, HPR 1156, HPR 1068</p> <p>Transplanted: 15 days old seedlings be transplanted of VL Dhan 221</p> <p>Black gram(Well drained conditions)</p> <p>Black Gram: Him Black Gram-1, UG-218</p>	<p>Spacing 15 cm x 15 cm in rice and planting 3-4 seedlings/hill in normal rice</p> <p>-Follow SRI technique if nursery can be raised elsewhere</p>	<p>ISOPOM, MGNA REGA, taking up seed production in RKVY for these crops</p>
		<p>Maize</p>	<p>Maize fodder, Maize+ legume fodder</p> <p>Blackgram/Kulthi /Sesame</p> <p>Maize fodder var.African Tall</p> <p>Black Gram :UG 218, Pant U 19,Him black Gram 1</p> <p>Finger millet: Baizu,Til (for Zone 1): LTK 4(all alternate upto 20July)</p>		
		<p>Vegetables Okra (P-8,Pusa Sawani ,Harbhajan)</p> <p>Tomato: Ineterminate varieties viz. Solan Vajr,Solan Garima,Solan Pride and Sindhur,Palam Pride and determinate Pink and Palam Pride) Chilli (Surajmukhi, CH-1)</p> <p>Cucurbits :, Bottle Gourd (PSPL, PSPR, Pusa</p>	<p>Vegetables Okra (P-8,Pusa Sawani ,Harbhajan)</p> <p>Tomato: Ineterminate varieties viz. Solan Braj, Solan Garima<Solan Sindhur,Palam Pink and Palam Pride)</p> <p>Chilli (Surajmukhi, CH-1)</p> <p>Cucurbits :Snake Gourd</p>	<p>For cucurbits seed germination be carried out in Poly tubes</p>	

Normal onset of winter rains Onset by 3 rd week of January		Meghdoot), Cucumber (Poinsette, KH1, Khira 75, Khira 90), Bitter Gourd Solan Hara Solan Safed) (Dehra, Nurpur and parts of Kangra)			
		Wheat	Wheat (late sown- VL892, /HS490/ HPW42)	Increase the seed rate and fertilizer by 25% when sown late with rains	MGNAREGA and taking up seed production in RKVY for these crops
		Wheat	Barley: HBL276/Dolma Oats: PLP1		
	Lowlands Medium deep loamy soils	Rice (Direct seeded)	Change of crop	Bajaura Makka, Vivek 21, Girija and Early composite, ,Baby corn(VL78/Early composite) Black Gram (UG-218, Himachal Mash-1) All crops on raised bed	

Condition		Suggested contingency measures			
Early season drought (delayed onset)	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 6 weeks 1 st week of August	Upland Rain-fed Loamy, coarse, loamy skeletal deep to medium deep soils	Rice (Direct seeded)	Change of crop as fodder or taking vegetables Bajra: Chari(fodder purpose) <i>Kharif</i> Onion(N53) Early Cauliflower: Early Kunwari, Pusa Deepali, Improved Japani Raddish: Japneese white, Chinese pink, Pusa Chetaki French bean: Contender,		ISOPOM, MGNAREGA, taking up seed production in RKVY for these crops

(Normal onset of winter rains by 1 st week of February			VLBoni, Pusa Parvati Araka Komal	
		Maize	Maize fodder, Maize+ legume fodder Blackgram/Kulthi /Sesame Maize fodder var.African Tall Black Gram :UG 218, Pant U 19,Him black Gram 1 Finger millet: Baizu,Til (for Zone 1): LTK 4(all alternate upto 20July)	
		Onion (AFLR, Palam Lohit) Radish (Pusa Himani) Faba bean	<i>Kharif</i> Onion(N53) Early Cauliflower: Early Kunwari, Pusa Deepali, Improved Japaneese white, Chinese pink, Pusa Chetaki	Proper land leveling and bunding; Addition of carbonaceous materials to increase water retention capacity of soil
		Wheat	Change of crop	Barley: HBL276/Dolma Oats: PLP1
	Lowland Medium deep thermic loamy soils	Rice (Direct seeded)	Change of crop as fodder or taking vegetables in raised beds Bajra: Chari(fodder purpose) <i>Kharif</i> Onion(N53) Early Cauliflower: Early Kunwari, Pusa Deepali, Improved Japaneese white, Chinese pink, Pusa Chetaki French bean: Contender, VLBoni, Pusa Parvati Araka Komal	

Condition	Suggested contingency measures				
Early season drought (delayed onset)	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 8 weeks 3 rd week of August (Normal onset of winter rains by 3 rd week of February)	Upland Rain-fed Loamy, coarse, loamy skeletal deep to medium deep soils	Rice (Direct seeded)	Change of crop means rabi season vegetables	Toria: Bhawani Oats Fodder : PLP1/Kent, Cauliflower: Early Kunwari, Pusa Deepali, Improved Japaneese white, Chinese pink, Pusa Chetaki Raddish: Japneese white, Chinese pink, Pusa Chetaki Frenchbean: Contender, VLBoni, Pusa Parvati, Araka Komal	ISOPOM,MGNAREG A, taking up seed production in RKVY for these crops
		Maize	Oats, fodder(PLP1), Toria (Bhawani) Raddish (Japneese white, Chinese pink, Early menu white Cauliflower(Early Kunwari, Pusa Deepali, Improved Japaneese white)/Peas (Mater Ageta/Azad Pea 1)		
		Wheat	Potato((Kufri Jayoti)/Onion (small areas with irrigationPalam Lohit,Patana red) Oats fodder(PLP1)		
		Vegetables	Vegetables Radish (Early)Japanese White/French bean (Contender) /Cauliflower (Early Kunwari, Pusa Deepali, Improved Japaneese white) Peas (Mater Ageta/Azad Pea 1)	Raised beds may be used as some times in this part of August and September heavy rains occur	Power tiller for raised beds and MANREGA for labour
	Lowlands Medium deep thermic loamy soils	Rice (Direct seeded)	Change of crop	Toria (Bhawani), Oats fodder(PLP1) Raddish (Japneese white, Chinese pink,	

				Early menu white Cauliflower: Early Kunwari, Pusa Deepali, Improved Japani French bean: Contender, VLBoni,Pusa Parvati Araka Komal	
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Condition	Suggested contingency measures				
	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measues	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.	Upland Rain-fed Loamy, coarse, loamy skeletal deep to medium deep soils	Rice (Transplanted)	Gap filling if more than 75% germination otherwise replanting	Top N dress recommendation of rainfed crop coinciding with rain splashes; rain water harvesting of surrounding fields, keep the crop weeds free	RKVY, ISOPOM
		Rice (Direct seeded)	Gap filling if population is >50% otherwise re sowing with 25% more seed rate	Top dressing of N recommendation of rainfed crop coinciding with rain splashes; Rain water harvesting of surrounding fields	
		Maize	Gap filling if population is >50% otherwise re sowing with 10% higher seed rate OR Intercropping/mixed cropping of Black gram/cowpea/sesame in rows	Drainage provision in intercropping, intercultural operations to make a soil mulch if no intercrop taken	
		Wheat	If germination below,50% go for re sowing with 25% more seed rate OR Mixed cropping with <i>Brassica</i> RCC4 (25% recommended seed rate of mustard)	Top dressing of N recommendation of rainfed crop coinciding with rain splashes;	
		Barley	If germination below, 50% go for re sowing with 25% more seed rate OR Shift of crop as fodder	Top dressing of N recommendation of rainfed crop coinciding with rain splashes;	
	Lowland Medium deep thermic	Rice (Transplanted)	Gap filling	Top dressing of N recommendation of rainfed crop coinciding with rain splashes; rain water harvesting	

	loamy soils			of surrounding fields	
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Condition	Suggested contingency measures				
	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	Upland Rain-fed Loamy, coarse, loamy skeletal deep to medium deep soils	Rice transplanted	Intercultivation	Foliar spray of urea 1-2% after showers ,mulching with the weeds and in-situ conservation through diverting water from adjoining areas	Awareness through the KVK and Agricultural department on the measures to be taken
		Rice direct seeded	Reduce population by 10-20% and remove weeds and inter culture to make a soil mulch condition	Foliar spray of urea 1% after showers, mulching with the weeds and in-situ conservation through diverting water from adjoining areas	
		Maize	Remove 10-20% stand ,weeding and inter cultural operations frequently to use soil as mulch	Foliar spray of nutrients 1-2%) after showers and Mulching with waste materials	
		Wheat	Cut the crop to reduce population ,remove weeds and inter culture	Foliar spray of nutrients, create soil mulch	
	Lowland Medium deep loamy soils	Rice	Remove weeds and reduce the plant population	Foliar N management instead of Top N dress; efficient weed management and their <i>in-situ</i> mulching	

Condition	Suggested contingency measures				
Mid season drought (long dry spell)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measure	Remarks on Implementation
	Upland Rain-fed Loamy, coarse, loamy skeletal deep to medium deep soils	Rice transplanted/ Rice direct seeded	Keep the fields weeds free	Foliar spray of N 1% after showers if stand is adequate, lifesaving irrigation, if possible Foliar N management instead of top N dress; efficient weed management and their <i>in-situ</i> mulching	Awareness about the use of foliar spray of nutrient
		Maize	Keep the fields free from weeds and if very poor crop use as fodder	Foliar spray of N 1-2%, if stand is adequate, interculture to create soil mulch, lifesaving irrigation if possible, use of mulch materials	
		Wheat	Keep the fields free from weeds and if very poor crop use as fodder	Foliar spray of N if stand is adequate, life saving irrigation if possible	
		Black Gram	Remove weeds and control insects	Lifesaving irrigation, create soil mulch through interculture	

Condition	Suggested contingency measures				
Terminal drought	Major Farming situation	Crop/cropping system	Crop management	Rabi Crop planning	Remarks on Implementation
	Upland Rain-fed Loamy, coarse, loamy skeletal deep to medium deep soils	Rice	If crop stand is poor then use of crop as fodder	Sowing of Radish/Peas/Toria as catch crop followed by Wheat OR in areas where drought is expected quite often then go for early wheat varieties viz., VL616/VL829/HPW251	
		Maize	If crop stand is poor then use of crop as fodder	Sowing of Toria/Gobhi sarson/radish/Peas in good moisture from last rains or in areas where drought is expected quite often then go for early sown wheat varieties viz.,	

				VL616/VL829/HPW251	
		Wheat	If crop stand is poor then use of crop as fodder	Prepare land for sowing of <i>Kharif</i> crop	
		Black Gram	If no pod setting then use as fodder or incorporate in soil as manure	Sowing of early sown wheat varieties (VL616/VL829/HPW251) OR Toria/Toria+Gobhi sarson	

2.1.2 Irrigated situation

Condition	Suggested contingency measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed/ limited release of water in canals due to low rainfall (Irrigation by <i>kuhls</i> from natural streams and the adequate discharge dependent on good rains)	Irrigated Loamy, coarse, loamy skeletal deep to medium deep soils	Rice	Direct seeded rice, HPR 1156, VL Dhan 221,	Spacing 15 cm x 15 cm in rice and planting 3-4seedlings/hill in normal rice -Follow SRI technique if nursery can be raised elsewhere	State agriculture departments AEOS and ADOs trainings by KVK /demonstrations/lectures and availability of seeds from university Popularization of micro irrigation schemes
		Wheat	Shift to late sown varieties viz., HS490,VL892 Wheat+Mustard (RCC4) Wheat+Gobhi sarson (Neelam)	-Irrigation only at critical stages (CRI, flowering and dough stage) -Popularization of split application of nitrogen	
		Vegetables	No change	-Proper bunding, if possible, use sprinkler irrigation -Using Split application of nitrogen and prefer foliar application	

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

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Rice	Strengthening of field bundings	N top dressing after water drainage and for control of blast disease spray carbendizim (1g/L)/ Tricyclozole 300g/ha. Treat the seeds before sowing with Beam 75WP (2 kg/ha seed).	Water drainage	Storage in safer warehouse/ covering the produce with polythene sheet
Maize	Drainage and application of nitrogen if yellowing takes place	For stalk rot control apply calcium hypochlorite (bleaching powder) @16.5kg/ha twice (at earthing up and flowering), top dress with N but do not mix bleaching powder	Drainage and cob harvesting from standing crop if physiologically matured	
Wheat	Additional dose of nitrogen (25kg/ha) to correct deficiency of nitrogen	Complete drainage of water and control of Rust/Blight with Zineb@	Complete drainage of water	After threshing undertake complete drying of grains under

	(yellowing)caused due to leaching	0.25%		sun to ensure no fungal infection and if rains continue take to safe storage place and ensure 12-14% moisture in grains
Black Gram	Drainage, control of anthracnose with Dithane M45	Disease control with Copper oxy chloride/Dithane M45(2.5g/L)	Complete drainage of water	Storage in safer farmer warehouse/tent covering the produce
Horticulture				
Colocasia	Ensure drainage	Drain water and control of leaf spots and rhizome rot (by drenching with carbendizim (1.0g/L) and spray of Dithane M 45 (2.5g/L)	Drain water and control of leaf spots and rhizome rot	Remove the rotten rhizomes from the healthy ones and properly dry in sun before storage
Cauliflower	Drain off the water from the fields and use of split application nitrogen and Dithane M 45 when sky is clear	Drain the fields and apply NPK and preventive spray of Dithane M -45(2.5g/L)	Drain the fields, control the curd rot with spray, harvest the curds which are ready and also remove the infested leaves from the plants	Immediate marketing of harvested curds
Okra	Drain off the water from the fields and apply nitrogen to plants with yellow leaves	Drain the fields and drench with Bavistin (1.0g/L)	Field drainage and harvesting	Before transport during packing the moisture should not too high
Cucumber	Drain off the water from the fields, carry out IPM, against jassid apply Malathion (1.0ml/l)	Against fruit fly attack resort to IDM/IPM, use pheromone traps and apply Malathion (1.0ml/L)	Field drainage and harvesting	Store in a cool and dry place, immediately transport to market
Onion	Drain off the water from the fields, resort to IDM/IPM. Against Jassids apply carbendizim (1.0g/L)/ DM-45 (2.5g/L) or Malathion (1.0ml/L)	Carry out IDM/IPM and drenching with carbendizim +DM45(1.0+2.5g/L)	Field drainage and harvesting	Storage and transport to market
Peas	Complete drainage of fields and immediate spray of carbendizim (1.0g/L)/ Dithane M 45 (2.5g/L)	Complete drainage of fields and spray of carbendizim (1.0g/L)/Dithane M 45 and immediate staking	-Drain off water from the fields and spray against powdery mildew. - Do not harvest if pods are wet , and delay harvesting until clear weather prevails otherwise the pods on storage soon after harvest	Before packing (in bags) ensure that the surface of pods are completely dry and immediately transport to the market

			will get rotten	
Heavy rainfall with high speed winds in a short span				
Rice	Strengthening the bunds of rice fields	Top N dress after water drainage	Drain off water from the fields	Storage in safer farmer warehouse/tent covering the produce
Maize	Drainage, earthing up and application of N if leaves of plants turn yellow	Earthing up and staking by tying two three plants together, for control of stalk rot dust with Copper hypochlorite(bleaching powder) , top N dressing but do not mix with bleaching powder	Drain off water and harvest cobs from the standing crop if at physiologically maturity	Storage in safer farmer warehouse/tent covering the produce. Ensure 12-14% moisture in grains before storage
Wheat	Additional dose of nitrogen (25kg/ha) to remove deficiency of nitrogen (yellowing of plant leaves) caused due to leaching	Completely drain off the water and control Rust/Blight with zineb Z-78 0.25%	Completely drain off the water and harvest the crop, if at physiological maturity	After threshing undertake complete drying of grains in sun to ensure no fungal infection and if rains continue take to safe storage place and ensure 12-14% moisture in grains before storage
Black Gram	Drain off water from field and control anthracnose with Dithane M45(2.5g/L)	Disease control with Copper oxy chloride / Dithane M45 (2.5g/L)	Drainage and selective pod harvest	Storage at safer farmer warehouse/tent covering of produce
Vegetables				
Colocasia	Ensure drainage	Drain water and control of leaf spots and rhizome rot (by drenching with Carbendizim (1.0g/L) and spray of Dithane M 45 (2.5g/L)	Drain water and control of leaf spots and rhizome rot	Remove the rotten rhizomes from the healthy ones and properly dry in sun before storage
Cauliflower	Drain off water from fields, apply split dose of nitrogen when the sky is clear and give preventive spray of Dithane M 45	Drain the fields and apply NPK and preventive spray of Dithane M -45 (2.5g/L)	Drain the fields, control the curd rot with spray, harvest the curds which are ready and remove the infested leaves from the plants	Immediately transport and market the curds
Okra	Drain off the water from the fields and apply nitrogen to plants with yellow leaves	Drain the fields and drench with Bavistin (1.0g/L)	Field drainage and harvesting	Before transport while packing the moisture should be optimum
Cucumber	Drain off the water from the fields, carry out IPM, against jassid apply Malathion (1.0ml/l)	Against fruit fly attack resort to IDM/IPM, use pheromone traps and apply Malathion (1.0ml/L)	Field drainage and harvesting	Store in a cool and dry place, immediately transport to market
Onion	Drain off the water from the fields, resort	Carry out IDM/IPM and drenching with	Field drainage and	Storage and transport to market

	to IDM/IPM. Against Jassids apply carbendizim (1.0g/L)/DM45 (2.5g/L) or Malathion (1.0ml/L)	carbendizim +DM45(1.0+2.5g/L)	harvesting	
Peas	Complete drainage of fields and immediate spray of carbendizim (1.0g/L)/Dithane M 45 (2.5g/L)	Complete drainage of fields and spray of carbendizim (1.0g/L)/Dithane M 45 and immediate staking	-Drain off water from the fields and spray against powdery mildew. - Do not harvest if pods are wet , and delay harvesting until clear weather prevails otherwise the pods on storage soon after harvest will get rotten	Before packing (in bags) ensure that the surface of pods are completely dry and immediately transport to the market
Outbreak of pests and diseases due to unseasonal rains				
Rice	Possibility of leaf blast attack, avoid immediate nitrogen application and apply carbendizim (1.0ml/L)	Possibility of leaf blast attack, drain off the water from the fields and control leaf blast by application of carbendizim (1.0ml/L), insect control with Chlorpyrifos (1.0g/L)	Water drainage from fields	Storage at safer farmer warehouse/tent covering the produce. Ensure 10-12% moisture in grains before storage
Maize	Drainage, and yellowing mainly due to nitrogen deficiency apply N split	Drainage, stalk rot control through copper oxy chloride (bleaching powder) (16.5kg/ha), leaf blight control through Dithane M45(2.5g/L)	Cob harvesting from standing crop	Storage in safer farmer warehouse/tent covering of produce. Ensure 10-12% moisture in grains before storage
Wheat	Drain off water and apply split dose of N to recover crop	Control rust with (Zineb Z78 (0.25%) or propiconazole (0.1%)	Completely drain off the water and harvest the crop, if at physiological maturity	After threshing undertake complete drying of grains in sun to ensure no fungal infection. If rains continue take to safe storage place and ensure 12-14% moisture in grains before storage
Black gram	Drain off water to avoid diseases; apply preventive spray of Dithane M45	Field drainage to avoid diseases; apply Dithane M45 (2.5g/L) and for borer attack, spray cypermethrin (1.0ml/L)	Drain off water and harvest the crop	Storage in safer places like warehouse/tent houses
Vegetables				
Peas	Against seed rot drench with Bavistin/and spray of Dithane M 45	Drench with the carbendizim (1.0g/L)/ Spray of Dithane M 45(2.5g/L) as	Control powdery mildew with Hexaconazole	Market after grading only

		preventive measure	(1.5g/L)	
Cauliflower/Cabbage	Apply copper oxy chloride (1.0g/L) / Dithane M 45(2.5g/L)as preventive spray	Apply copper oxy chloride +Dithane M 45 as preventive spray(1.0+2.5g/L), remove diseased leaves	-Remove the rotten heads, control Head Rot with Blitox /Dithane M 45 as preventive spray and remove diseased leaves Immediately harvest the curds/heads showing head rot symptoms	Storage and immediate transport to market
Okra	Drainage/IDM/IPM Malathion 1ml/L for jassid, borer and vector of virus	IDM/ IPM Malathion 1ml/L for jassid, borer and vector of virus Dithane M 45 (2.5g/L)	Field drainage	Storage and immediate transport to market
Cucurbits	Staking/Drainage/IDM/IPM Malathion 1ml/L for jassid	Staking/IDM/IPM pheromone traps for fruit fly and malathion(1.0ml/L) for jassid	Field drainage	Storage and immediate transport to market

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
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			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave				
Maize	Mulching to buffer effect of high temp.	Continue weed mulching	<i>In-situ</i> weed mulching	
Paddy	Light and repeated irrigation at the appearance of hair line cracks in soil surface, Correct	Repeated irrigation at the appearance of hair line cracks in soil surface, pounding of water for	Repeated irrigation at the appearance of hairline cracks in soil surface	Harvest crop at physiological maturity

	iron deficiency with 0.5% iron sulphate spray.	15 days after transplanting to check Fe deficiency and for crop establishment.		
Wheat	Frequent and light irrigation	Not applicable	Frequent and light irrigation	Frequent and light irrigation
	Irrigation, if available may be applied to combat the effect of high temperature			
Horticulture				
Mango	Shade with wild bushes	Irrigation if available may be applied to combat the effect of high temperature	Irrigation if available may be applied to combat the effect of high temperature	
Litchi	Shade with wild bushes	Irrigation if available may be applied to combat the effect of high temperature	Irrigation if available may be applied to combat the effect of high temperature	
Cold wave				
Wheat	Apply irrigation using sprinklers if available, smoking during night	Apply irrigation using sprinklers if available, smoking during night	Apply irrigation using sprinklers if available, Burning of crop residue around the crop, Spray of H ₂ SO ₄ @0.1%	
	Light frequent irrigation may be practiced wherever irrigation facilities are available			
Horticulture				
Mango	Shade with wild bushes	Frequent irrigation, Apply irrigation using sprinklers if available	Frequent irrigation	
Frost				
Wheat	Apply irrigation using sprinklers if available, smoking during night	Apply irrigation using sprinklers if available, smoking during night	Apply irrigation using sprinklers if available, Burning of crop residue around the crop, Spray of H ₂ SO ₄ @0.1%	
Horticulture				
Mango	Shade with wild bushes/ jute bags	Frequent irrigation, Apply irrigation using sprinklers if available		
Hailstorm				
Horticulture				

Mango	Not applicable	Anti hail netting at fruit bearing stage
Pear	Not applicable	Anti hail netting at fruit bearing stage
K.Lime	Not applicable	Anti hail netting at fruit bearing stage
Galgal	Not applicable	Anti hail netting at fruit bearing stage
Guava	Not applicable	Anti hail netting at fruit bearing stage
Cyclone	Not applicable	

2.5 Contingent strategies for Livestock, Poultry & Fisheries Livestock

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	Availing Insurance, culling undesirable livestock ; raising of fodder trees, replacement of unproductive animals with improved ones
Drinking water	Use of ground water resource, maintain the storage of water in tanks , traditional water ponds , rivers	Utilization of stored water, stall drinking, rivers , traditional water ponds	Rejuvenation of water sources, bleach drinking water source

Health and disease management	Advance preparation with medicines and vaccination, local ethno pharmaceutical and modern medicines, in addition antimicrobial/ antibiotic sensitivity profiling of all the common bacterial pathogen causing significant disease syndrome should be known, procure multivitamins and mineral mixture, refresher trainings to Veterinary Officers and Pharmacists	-Carry out de worming to all animals, quarantine sick animals, rig vaccination (in 8km radius), restrict movement of livestock in case of epidemic, tick control, daily lifting of dung from relief camps. -Treatment of all affected livestock by mass campaign, modern veterinary care, veterinary camps , isolation, appropriate antibiotics /treatments could be instituted	Proper veterinary care , awareness, capacity building of locals, health care and management, surveillance on disease outbreak, vaccination, keep animal house clean and spray disinfectant, advise to framers for breeding milch animals during July to September (with adequate fodder supply and favorable weather conditions) in order to avoid the peak milk production during mid summer
Floods			
Feed and fodder availability	Increasing area under fodder crops	Evacuation to safer places	Availing Insurance,
Drinking water	Storage of water in tanks	Arrange safe drinking water	Arrange safe drinking water
Health and disease management	Advance preparation with medicines and vaccination	Availability of veterinary staff, to provide quick treatment and relief to affected animals	
Cyclone			
Feed and fodder availability	Not applicable		
Drinking water	Not applicable		
Health and disease management	Not applicable		
Cold wave and heat wave			
Shelter/environment management	With setting of winter bring the livestock back from high hill pasture lands to nearby pastures; restrict open grazing during cold wave	Stationary conditions and feeding in cowsheds, group living, dry grass flooring, gunny bags on windows, gunny bags wrapped on the belly of milking animals, restrict to open grazing during sunny days only	Open grazing in sunny days, massage of milking animals and other species, hot water bath of animals
Health and disease management	Feed traditional herbs to animals Use immune modulators	Provide warm living conditions, feed roasted lassi syrup (curd juice) to animals, avoid exposure to cold and rains/ snow. Provision of fans /shade during heat wave and give multivitamins minerals	Open grazing in sunny days and feeding of medicinal herbs. In case of acute problem contact local veterinarian

^s based on forewarning wherever available

2.5.1 Poultry

Poultry	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Shortage of feed ingredients	Availing Insurance, establishment of feed serve bank and storage of feed at the farm	Supply of feed from the adjoining areas through Departmental interventions	Promotion of feed resources, availing insurance
Drinking water	Not a major problem, through construction of small rain harvesting storage structures in water scarce areas	Supply of water through Departmental interventions sanitation of drinking water	Construction of small rain harvesting storage structures for contingent plans., give adequate water as per requirement
Health and disease management	Surveillance and management by Department of Animal Husbandry, culling sick birds, de-worming and vaccination against infectious /contagious diseases	Surveillance and management by Department of Animal Husbandry, mixing Vit A,D,EK and B complex in water	Surveillance and management by Department of Animal Husbandry. Hygiene and sanitation of poultry house, disposal of dead birds by burying
Floods			
Not applicable			
Shortage of feed ingredients			
Drinking water			
Health and disease management			
Cyclone			
Not applicable			
Shortage of feed ingredients			
Drinking water			
Health and disease management			
Heat wave and cold wave			
Not applicable			
Shelter/environment management	Adequate ventilation during day and night in summer and adequate protection from cold is exercised during winter		
Health and disease management	Not available		

Based on forewarning wherever available

2.5.3 Fisheries

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	Impounding of water through interventions of Department of Fisheries to save fish germplasm	Water harvesting structures with rain water impounding from catchment areas; watershed development planning and implementations.
Impact of heat and salt load build up in ponds / change in water quality	Not applicable		
Floods	Not applicable		
Heat wave and cold wave	Not applicable		

^a based on forewarning wherever available