State: HIMACHAL PRADESH

Agriculture Contingency Plan for District: Solan

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. (14.2)		
	Agro-Climatic Zone (Planning Commission)	Western Himalayan Region (I)		
	Agro Climatic Zone (NARP)	Sub-Montane 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 block of Sirmaur, Kullu (S. Part), Dharmashala block of Kangra (S. Part)		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		30^0 42" and 31^0 15" N	76^0 42" and $77^0$20" E	**300-3000m**
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	-		
	Mention the KVK located in the district with address	Krishi Vigyan Kendra,Kandaghat , Dr Y S Parmar University of Horticulture & Forestry, Kandaghat, Solan, HP Himachal Pradesh 173 215		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	IMD –Shimla		

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): (67.04%)	971.82	37.5	2nd week of July	4th of August
	NE Monsoon (Oct-Dec): (3.82%)	39.18	4.0		
	Winter (Jan- March): (20.25%)	64.12	15.5		
	Summer (Apr-May): (8.39%)	67.46	6.2		
	Annual	1142.58	63.2		

***Average rainfall from 1993 to 2004, SREP, Solan**

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)	193.7	43.6	20.3	12.1	77.3	14.5	0.4	12.4	4.4	0.9

State Statistical Abstract of HP, 2008-09

1. 4	**Major Soils (common names like red sandy loam deep soils (etc.,)***	**Area ('000 ha)**	**Percent (%) of total**
	Loam soils	118.5	65.5
	Sandy loam soils	33.8	18.6
	Clay soils	24.51	13.5
	Sandy soils	4.1	2.2
	Total	180.92	100.0

*** State Statistical Abstract of HP, 2008-09; SREP (State Research and Extension Plan –Directorate of Agriculture –Shimla) ;** The plain and gentle sloping with shallow light textured soils consitutue 43.11 per cent; the hilly terrain with loam to clay loam soils constitute 61.23 per cent and hilly and mountainous terrain with silt loam to loam soils constitutue 5.66 per cent of the total.

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	38.3	167.1
	Area sown more than once	25.6	
	Gross cropped area	64.0	

1.6	**Irrigation**	Area ('000 ha)		
	Net irrigated area	10.50		
	Gross irrigated area	18.112		
	Rainfed area	28.78 (2004-05)		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area

	Canals			
	Tanks/Ponds		0.41	4.33
	Open wells			
	Bore wells/Wells /tube wells		0.70	7.38
	Lift irrigation schemes		6.81	71.81
	Micro-irrigation			
	Other sources (*Kuhls*)		1.6	16.48
	Total Irrigated Area			
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited			
	Critical			
	Semi- critical			
	Safe	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: SREP, Solan)

1.7 Area under major field crops & horticulture (as per latest figures) (2005)

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Maize	0	21.7	21.7	-	-	-	-	-
	Paddy	36.4	0	36.4	-	-	-	-	--
	Wheat	-	-	-	-	23.8	23.8	-	23.8

	Barley					1.5	1.5	-	1.5

(Source: State Statistical Abstract of HP, 2008-09)

	Horticulture crops – Fruits	**Area ('000 ha) (2005-06)**		
		Total	**Irrigated**	**Rainfed**
	Apple	0.103		0.103
	Other temperate fruits	2.958		2.958
	Dry fruits	0.308		0.308
	Citrus	0.706		0.706
	Other sub-tropical fruits	2.216		2.216

	Horticulture crops – Vegetables (2005-06)	**Total**	**Irrigated**	**Rainfed**
	Peas (green)*	1.142	1.142	
	Tomato*	3.800	3.800	A small quantity
	Beans	0.442	0.442	
	Onion	0.037	0.037	
	Cauliflower	0.106	0.106	
	Radish, turnip & Carrot	0.093	0.093	
	Bhindi	0.124	0.124	
	Cucurbits*	0.110	0.110	

	Capsicum & chillies	0.601	0.601	
	Potato*	0.130	0.130	
	Garlic*	0.091	0.091	A small quantity
	Cabbage	0.071	0.071	
	Other vegetables	2.561	2.561	
	Total	6.982	6.982	

(District Agricultural Plan, Vol II, Solan)

	Medicinal and Aromatic crops	**Total**	**Remarks**
	Stevia	8.40 ha (16 farmers)	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
	Safed Musli	3.80 ha (17 farmers)	
	Milk Thistle	2.50 (19 farmers)	
	Ashwgandha	2.50 ha (16 farmers)	
	Jatropha	2.60 ha (15 farmers)	
	Jamun	7.50 ha (14 farmers)	
	Aonla	8.00 ha (20 farmers)	
	Others	10.00 ha (61 farmers)	
	Total	**42.30 ha (178 farmers)**	

SAEP-Solan

	Plantation crops	**Total**	**Irrigated**	**Rainfed**
	No plantation crops are			

	available in Solan district			
	Eg., industrial pulpwood crops etc.			

	Fodder crops*	**Total**	**Irrigated**	**Rainfed**
	Total fodder crop area			
	Grazing land	77.30 (000 ha)		77.30 (000 ha)
	Sericulture etc			
	Others (specify)	Open grazing**		

*Nearly 352.6 (000 ha) of total geographical area (692.4 thousand ha) is under permanent pasture and other grazing land. Tree fodder is the major source of fodder as more than 75% of the requirement is met from tree fodder. Open grazing is followed with herds of animals in permanent pastures and grazing land. The agriculture waste like maize stalks, wheat straw etc are also used as a source of fodder. However, there is no practice of cultivating grasses in Solan.

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)			152.77
	Improved cattle			-
	Crossbred cattle			-
	Non descriptive Buffaloes (local low yielding)			-
	Descript Buffaloes			90.79
	Goat			67.49
	Sheep			4.31
	Others (Camel, Pig, Yak etc.)			16.26
	Commercial dairy farms (Number)			-

1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**
	Commercial	Not available	Not available

	Backyard	----	79.819

1.10	**Fisheries** (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department) Nil	**No. of fishermen**	**Boats**		**Nets**		**Storage facilities (Ice plants etc.)**
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
		-	-	-	-	-	-
	ii) Inland (Data Source: Fisheries Department) 266.87 M.T(2005-06)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		-		-		-	
	B. Culture						
				Water Spread Area (ha)	**Yield (t/ha)**	**Production ('000 tons)**	
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)			-	-	-	
	ii) **Fresh water** (Data Source: Fisheries Department)*			-	-	-	
	Others						

*Few peoples are traditionally involved in collection of fresh water fish namely Mahaseer, Trout, which is traded localy. A catch of 10-15 kg fish is generally brought to local market on the day of fish catch. It is additional income generating activity for the farmers. The total number of the catch days do not exceed 30-35 days in a year.

1.11 Production and Productivity of major crops

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)	
Major Field Crops (Crops to be identified based on total acreage)										
	Maize	38.3	1717	-	-	-	-	38.3	1717	76.6

	Rice	9.3	1970	-	-	-	-	9.3	1970	14.0
	Wheat	-	-	42.59	1750	-	-	42.5	1750	63.8
	Barley	-	-	1.26	875	-	-	1.2	875	1.8
Major Horticultural Crops (Crops to be identified based on total acreage)										
	Apple	0.089	7618					0.089	7618	
	Other Temperate fruits	3.678	1224					3.678	1224	
	Dry fruits	0.161	526.50					0.161	526.50	
	Citrus	0.729	1079.50					0.729	1079.50	
	Other sub-tropical fruits	1.157	524.33					1.157	524.33	

1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	**Maize**	**Paddy**	**Wheat**	**Barley**	**Pulses**
	Kharif- Rainfed	2nd week of June- 2nd week of July				2nd week of June – 2nd week of July
	Kharif-Irrigated		2nd week of June- 2nd week of July			
	Rabi- Rainfed			2nd week of October – 2nd week of November	November - December	
	Rabi-Irrigated					

-	**What is the major contingency the district is prone to?** (Tick mark)	**Regular**	**Occasional**	**None**
	Drought	√		
	Flood		√(in limited plain areas)	
	Cyclone			√
	Hail storm	√		
	Heat wave		√ (in limited plain areas)	

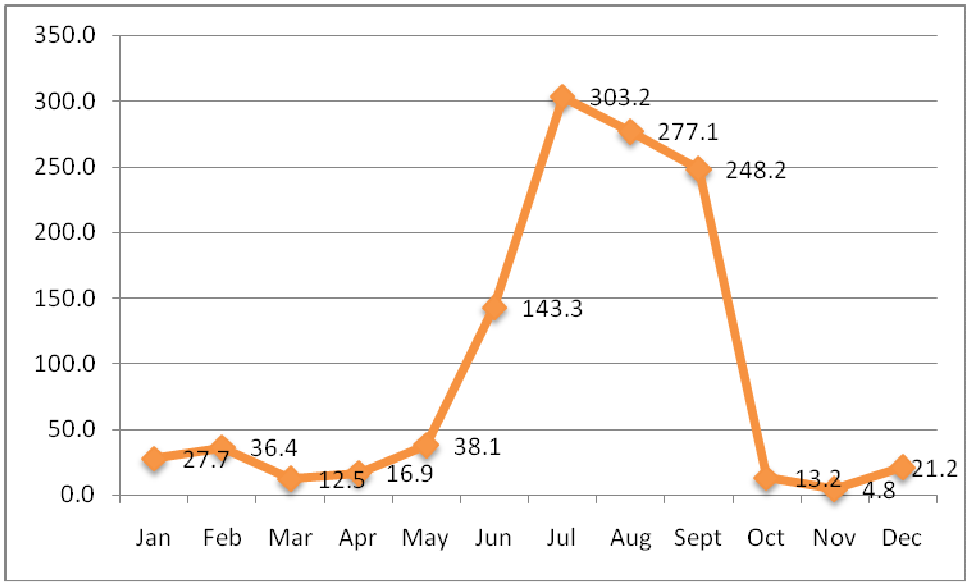
	Cold wave			√
	Frost		√	
	Sea water intrusion			√
	Pests and disease outbreak (specify)			√
	Others (specify)			√

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 I


Chamba
Lahul & Spiti
Kangra
Kullu
Hamirpur
Una
Mandi
Kinnaur
Bilaspur
Shimla
Solan
Sirmour

Annexure II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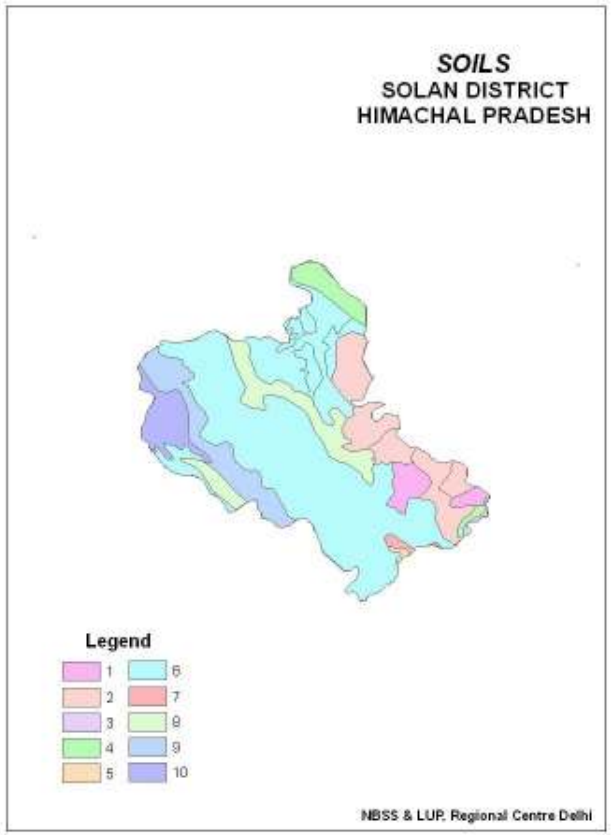
300.0
250.0
200.0
150.0
100.0
50.0
0.0
27.7
36.4
12.5
16.9
38.1
143.3
303.2
277.1
248.2
13.2
4.8
21.2
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec

Annexure III



Soil Unit	Description	Area (ha)
	SOILS OF SIDE / REPOSED SLOPES	
1	Deep, loamy-skeletal soils with severe erosion and slight to moderate stoniness; *associated with*: Loamy soils	4166.849
2	Shallow, loamy-skeletal soils with severe erosion and strong stoniness; *associated with*: Rock outcrops	26443.79
3	Medium deep, loamy, calcareous soils with moderate to severe erosion	14886.99
4	Medium deep to deep loamy soils with moderate to severe erosion	7894.549
	SOILS OF SUMMITS AND RIDGE TOPS	
5	Medium deep, loamy-skeletal soils with severe erosion; *associated with*: Deep loamy soils with moderate erosion and moderate stoniness	6097.416
	SOILS OF SIDE / REPOSED SLOPES	
6	Medium deep to deep, loamy-skeletal soils moderate to severe erosion; *associated with*: Loamy soils with moderate erosion	100744.5
7	Deep, loamy soils with moderate erosion and moderate stoniness; *associated with*: Medium, deep, loamy soils	6376.552
	SOILS OF FLUVIAL VALLEY	
8	Shallow, sandy soils with moderate erosion; *associated with*: Loamy soils	10728.52
	SOILS OF PIEDMONT PLAINS	
9	Deep, loamy soils with moderate to severe erosion; *associated with*: Medium deep soils	10392.69
10	Medium deep, loamy soils with slight to moderate erosion; *associated with*: Deep soils	5866.857
	Total area	193598.7

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 **4th week of July**	Low hills and valley areas	**Rainfed** • Maize-wheat • Paddy wheat • Maize- Toria- Wheat • Maize+ Black gram- Wheat+ Brassica • Tomato/Okra/Cucurbits/ Colocasia - Wheat	Maize: K-517, K-9451, K-25 and KH-2005 (K= Kanchan); Rajmash- Jawala and local;Pea-Arkel) Inter-cropping of Rajmash	Moisture Conservation Intercultivation Thinning	Link with NSC,SAU, department of agriculture for getting good seed & KVK
	Low mid hills	**Rainfed** • Maize-Wheat / Wheat + Brassica • Maize – Barley • Maize + Black Gram / Horse Gram – Wheat / Wheat + Brassica • Tomato/Ginger/ Cucurbits-Wheat	No change	Gap filling with improved seeds if the plant population is around 70% Weed control through interculture	
	High mid hills	Rainfed • Rainfed Maize – Wheat + Brassica • Maize + Black Gram-Wheat/Brassica/Gram • Maize – Peas • Paddy – Wheat • Tomato/Cucrbits/Ginger/Colocsia –Wheat • Black gram – Wheat • Tomato – Wheat			
	High hills	**Rainfed** • Maize/Rajmash/Mash –	No change	-	

		Wheat/Barley • Tomato/Beans/Cucurbits/Ginger – Wheat/Barley			

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 4 weeks **2nd week of August**	Low hills and valley areas	**Rainfed** Maize-wheat Paddy wheat Maize- Toria- Wheat Maize+ Black gram- Wheat+ Brassica Tomato/Okra/Cucurbits/ Colocasia - Wheat	Cultivation of Short Duration Crops like Cabbage (Tokita – Boy – matures in 60 days) Cauliflower (Vigro - matures in 55days) Methi Inter-cropping of rajmash	Moisture Conservation measures Interculture Dry sowing 10-12 days before rains with higher seed rate	Link NSC,SAU,department of agriculture for getting good seed & KVK
	Low mid hills	**Rainfed** • Maize-Wheat / Wheat + Brassica • Maize – Barley • Maize + Black Gram / Horse Gram – Wheat / Wheat + Brassica • Tomato/Ginger/ Cucurbits-Wheat	Palak *In situ* sowing of walnut, pecan and aonla seeds in September for better survival and success		
	High hills	**Rainfed** • Maize/Rajmash/Mash – Wheat/Barley • Tomato/Beans/Cucurbits/Ginger – Wheat/Barley • Maize – Cole crops/Peas/Potato	Maize: K-517, K-9451, K-25 and KH-2005 (K= Kanchan); Rajmash- Jawala and local;Pea-Arkel) Inter-cropping of Rajmash		

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop / Cropping system[b]**	**Change in crop / cropping system[c] including variety**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 6 weeks **4th week of August**	Low hills and valley areas	**Rainfed** Maize-wheat Paddy wheat Maize- Toria- Wheat Maize+ Black gram- Wheat+ Brassica Tomato/Okra/Cucurbits/ Colocasia - Wheat	Maize-wheat Paddy wheat Maize- Toria- Wheat Maize+ Black gram- Wheat+ Brassica Tomato/Okra/Cucurbits/ Colocasia - Wheat Cultivation of Short Duration Crops like cabbage (Tokita – Boy – matures in 60 days) Cauliflower (Vigro - matures in 55days),Methi , Palak *In situ* sowing of walnut, pecan and aonla seeds in September for better survival and success	Moisture Conservation measures Interculture Inter-cropping of Rajmash Dry sowing 10-12 days before rains with higher seed rate -	Link NSC,SAU,department of agriculture for getting good seed Link KVK and other extension agencies to create awareness among the farmers and also to up grade their skills -
	High hills	**Rainfed** • Maize/Rajmash/Mash –Wheat/Barley • Tomato/Beans/Cucurbits/Ginger – Wheat/Barley • Maize – Cole crops/Peas/Potato			

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop / Cropping system[b]**	**Change in crop / cropping system[c] including variety**	**Agronomic measures[d]**	**Remarks on Implementation[e]**

Delay by 8 weeks **2nd week of September**	Low hills and valley areas	**Rainfed** Maize-wheat Paddy wheat Maize- Toria- Wheat Maize+ Black gram- Wheat+ Brassica Tomato/Okra/Cucurbits/ Colocasia - Wheat	Grow Fodder species, pulses Cultivation of Short Duration Crops like Cabbage (Tokita – Boy – matures in 60 days),Cauliflower (Vigro - matures in 55days), Methi , Palak *In situ* sowing of walnut, pecan and aonla seeds in September for better survival and success Inter-cropping of Rajmash	Moisture Conservation measures Clearing of weeds Rouging Dry sowing 10-12 days before rains with higher seed rate	Link NSC,SAU,department of agriculture for getting good seed Link KVK and other extension agencies to create awareness among the farmers and also to up grade their skills
	Low mid hills	**Rainfed** 1. Maize-Wheat / Wheat + Brassica 2. Maize – Barley 3. Maize + Black Gram / Horse Gram – Wheat / Wheat + Brassica 4. Tomato/Ginger/ Cucurbits- Wheat	-		
	High mid hills	**Rainfed** 1. Maize – Wheat + Brassica 2. maize + Black Gram-Wheat/Brassica/Gram 3. Maize – Peas 4. Paddy – Wheat 5. Tomato/Cucrbits/Ginger/Colocsia – Wheat 6. Black gram – Wheat 7. Tomato – Wheat	-		
	High hills	**Rainfed** 1. Maize/Rajmash/Mash –Wheat/Barley 2. Tomato/Beans/Cucurbits/Ginger – Wheat/Barley 3. Maize – Cole crops/Peas/Potato	-		

Condition			Suggested Contingency measures		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal Crop/cropping system[b]**	**Crop management[c]**	soil nutrient & moisture conservation measues[d]	**Remarks on Implementation[e]**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Low hills and valley areas	Rainfed Maize-wheat	Reduction of plant population Dry sowing of maize and adopt line sowing Hand weeding in maize.	• Mulching in between the rows in maize with materials like uprooted weeds or grass from fields • Foliar spray of urea @ 0.5 % to replace soil application • Use of drippers and sprinkler irrigation from rainwater harvesting structures • Use of different type o organic materials of mulches	Link NSC,SAU,department of agriculture for getting good seed Link KVK and other extension agencies to create awareness among the farmers and also to up grade their skills LinkSAUs, Watersheds, MNAREGA for the support of waterharvesting structure
		Paddy- wheat	Hand weeding in paddy		
		Maize+ Black gram- Wheat+	• Intercropping of black gram when there is a poor growth of existing maize		
		Tomato/Okra/Cucurbits	During first fortnight of September fields with good moisture in low valley areas, be sown with determinate varieties/ hybrids of tomato (RUPALI, MTH-15 like French Bean or Early Pea		
	Low mid hills	**Rainfed** Maize-Wheat / Wheat + Brassica Maize – Barley	• Reduction in plant population • Dry sowing of maize and line sowing • In unsown area of cowpea go for alternate crop Himachal Lobia • Hand weeding in maize.	• Mulching in between the rows in maize with materials like uprooted weeds or grass from fields • foliar spray of urea @ 0.5 % to replace soil application • Use of drippers and sprinkler irrigation from rainwater harvesting	
		Maize + Black Gram / Horse Gram – Wheat / Wheat + Brassica	• Intercropping of black gram when there is a poor growth of existing maize		

				structures • Use of different type o organic materials of mulches	
		Tomato/Ginger	During first fortnight of September fields with good moisture in low valley areas, be sown with determinate varieties/ hybrids of tomato (RUPALI, MTH-15 like French Bean or Early Pea		
	High mid hills	**Rainfed** Maize – Wheat + Brassica Maize + Black Gram-Wheat/Brassica/Gram	• Reduction in plant population • Dry sowing of maize and line sowing • In unsown area crop of cowpea (Himachal Lobia-should be sown • Hand weeding in maize. • Intercropping of black gram when there is a poor growth of existing maize		
		Paddy – Wheat	• Reduction in plant population • In unsown area crop of cowpea (Himachal Lobia-1) should be sown • Sowing of dk-1 or bhawani variety of toria and palampur-1 or kent variety of oats during 1st fortnight of september • Intercropping of black gram when there is a poor growth of existing maize • During first fortnight of September fields with good moisture in low valley areas, can be sown with determinate varieties/	• Hand weeding in paddy mulching in between the rows in maize with materials like uprooted weeds or grass from fields • foliar spray of urea @ 0.5 % to replace soil application • Use of drippers and sprinkler irrigation from rainwater harvesting structures • Use of different type o organic materials of mulches	

			hybrids of tomato (RUPALI, MTH-15) • In case of good moisture, fields with poor crop growth can be removed and re-sown with crop		
		Tomato/Cucrbits/Ginger/ colocsia – Wheat	During first fortnight of September fields with good moisture in low valley areas, be sown with determinate varieties/ hybrids of tomato (RUPALI, MTH-15 like French Bean or Early Pea		
	High hills	**Rainfed** Maize/Rajmash/Mash – Wheat/Barley	• Reduction in plant population • Dry sowing of maize and line sowing • In unsown area crop of cowpea (Himachal Lobia-should be sown • Hand weeding in maize.		
		Tomato/Beans/Cucurbits/	During first fortnight of September fields with good moisture in low valley areas, be sown with determinate varieties/ hybrids of tomato (RUPALI, MTH-15 like French Bean or Early Pea		
		Ginger – Wheat/Barley	During first fortnight of September fields with good moisture in low valley areas, be sown with determinate varieties/ hybrids of tomato		

			(RUPALI, MTH-15 like French Bean or Early Pea		
		Maize – Cole crops/Peas/Potato	• Intercropping of black gram when there is a poor growth of existing maize		

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[b]**	**Crop management[c]**	soil nutrient & moisture conservation measues[d]	**Remarks on Implementation[e]**
At vegetative stage	Low hills and valley areas	**Rainfed** Maize-wheat Paddyheat Maize+ Black gram Tomato/Okra/Cucurbits/ colocasia – Wheat	Gap filling with improved seeds when the plant population is around 70% of optimum Dry sowing of maize and line sowing Intercropping of black gram when there is a poor growth of existing maize	• Hand weeding in maize and paddy. • Mulching in between the rows in maize with materials like uprooted weeds or grass from fields • Foliar spray of urea @ 0.5 % to replace soil application • Life saving irrigation through water harvesting structures • Use of drippers and sprinkler irrigation • Removal of weeds from the field	Link NSC,SAU and department of agriculture for the supply of seed Link watershed, MNAREGA,RKY for the support of water harvesting struxtures

	Low mid hills	**Rainfed** • Maize-Wheat / Wheat + Brassica • Maize – Barley • Maize + Black Gram / Horse Gram – Wheat / Wheat + Brassica • Tomato/Ginger/ Cucurbits- Wheat	• Dry sowing of maize and line sowing • Intercropping of black gram when there is a poor growth of existing maize	• Hand weeding in maize • mulching in between the rows in maize with materials like uprooted weeds or grass from fields • foliar spray of urea @ 0.5 % to replace soil application • Life saving irrigation from water harvesting structures • Use of drippers and sprinkler irrigation • Use of different type of mulches • Removal of weeds from the field	
	High mid hills	• Brassica • Tomato – Wheat-Maize – Potato/Peas/Cole crops	• Dry sowing of maize and line sowing • Intercropping of black gram when there is a poor growth of existing maize		
		• Maize + Rajmash-Wheat+ Oil seed • Rajmash- Jawala and local			
		• Maize-Cole crops/Pulses - wheat/pea Pea-Arkel			
	High hills	**Rainfed** 1. Maize/Rajmash/Mash –Wheat/Barley 2. Tomato/Beans/Cucurbits/Ginger – Wheat/Barley 3. Maize – Cole crops/Peas/Potato	• Dry sowing of maize and line sowing		

Condition			**Suggested Contingency measures**		
Mid season drought (long dry	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture**	**Remarks on Implementation**

spell)				**conservation measues**	
At flowering/ fruiting stage	High hills to high mid hills	Apple	Training and pruning of apple orchards Thinning of fruits Use of Standard high colour varieties, drought resistant varieties viz., Red chief, Use of spur type cultivars, use of Clonal rootstocks viz., Malling and Merton	Use of Mulching (plastic and hay mulch) Manual weeding Clean basin cultivation Water harvesting measures with half moonbasins Use of drip irrigation foliar spray of urea @ 0.5 % to replace soil application Use of drippers and sprinkler irrigation Use of different type of mulches	Link KVK and department of agriculture and SAUs to create awareness camps,demonstrationsand exposure visits andtrainings to the farmers

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**
	Low hills and valley areas	**Rainfed** Maize-wheat Paddy wheat Maize- Toria- Wheat Maize+ Black gram- Wheat+ Brassica Tomato/Okra/Cucurbits/ Colocasia - Wheat	Life saving irrigation Harvest at physiological maturity stage Harvest for fodder If the damage will be severe	Plan for land preparation and sowings of rabi crops likeToria, Wheat, Barley, Pea (October Month)	Link KVK, Department of agriculture and SAUs, link waterheds, MNAREGA, Horticulture mission

	Low mid hills	**Rainfed** • Maize-Wheat / Wheat + Brassica • Maize – Barley • Maize + Black Gram / Horse Gram – Wheat / Wheat + Brassica Tomato/Ginger	Life saving irrigation Harvest at physiological maturity stage Harvest for fodder If the damage will be severe	Plan for land preparation and sowings of rabi crops likeToria, Wheat, Barley, Pea (October Month)	
	High mid hills	• **Rainfed** Maize – Wheat + Brassica • maize + Black Gram-Wheat/Brassica/Gram • Maize – Peas • Paddy – Wheat • Tomato/Cucrbits/Ginger/Colocsia –Wheat • Black gram – Wheat Tomato – Wheat			
	High hills	**Rainfed** • Maize/Rajmash/Mash – Wheat/Barley • Tomato/Beans/Cucurbits/Ginger – Wheat/Barley • Maize – Cole crops/Peas/Potato			

2.1.2 Drought - Irrigated situation

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in kuhls due to low rainfall	undulating lands and brown forest soils	Paddy (sub merged conditions	Maize and Aerobic rice Millets	• Select short duration varieties of Aerobic rice and vegetables • Irrigation at critical crop growth	Link extension agencies and kVKs to createwareness on technologies to

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
		Vegetables based cropping system (Capsicum, Potato, French Bean, Cabbage, Chilli,tomato)	Less area under vegetables and More areawith Maize and Aerobic rice Millets	stages • Alternate furrow irrigation • Drip irrigation • Foliar application of urea 2 %	the farmers

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Limited release ofkuhls in kuhls due to low rainfall	undulating lands and brown forest soils	Paddy (sub merged conditions) Vegetable based (Capsicum, Potato, French Bean, Cabbage, Chilli,tomato)	Continue vegetable based system	Mulching in crop rows Ridge and furrow planting Irrigation at crtical crop growth stages Alternate Furrow irrigation Drip irrigation	Link extension agencies and kVKs to createwareness on technologies to the farmers

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 kuhls under delayed onset of monsoon in catchment	undulating lands and brown forest soils	Paddy (sub merged conditions)	Millets	Select short duration varieties of millets Insitu conservation measures liker ridge and furrow	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
				Mulching in crop rows with organic materials Ranwater harvesting,storage and recycling methods	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	undulating lands and brown forest soils	Paddy (sub merged conditions), tomato, vegetables	Maize, Aerobic rice and vegetables (Tomato, chilli and Brinjal)	Irrigation at critical crop growth stages Drip irrigation Spray 2% urea Control of insects and pests	Link extension agencies and kVKs to createwareness on technologies to the farmers

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Insufficient groundwater recharge due to low rainfall	undulating lands and brown forest soils	Paddy (sub merged conditions)	Maize, Aerobic rice and vegetables (Tomato, chilli and Brinjal)	Irrigation at critical crop growth stages Hand weeding and mulching in crop rows Spray 2% urea Drip irrigation Control of insects and pests	Link extension agencies and kVKs to createwareness on technologies to the farmers

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

Condition	Suggested contingency measure

Continuous high rainfall in a short span leading to water logging	**Vegetative stage[k]**	**Flowering stage[l]**	**Crop maturity stage[m]**	**Post harvest[n]**
Capsicum	Provide drainage	Grow crops in protected structures Provide drainage	Draianage Harvesting at physiological maturity Use stakes and avoid touching of fruits to the ground	Grade and pack after safe storage at pack and grading houses
Cabbage	Provide drainage			
Tomato	Provide drainage			
Beans	Provide drainage			
Cucurbits	Provide drainage			
Horticulture			Harvesting at physiological maturity	
Apple	Provide drainage	Drain out excess water		Grade and pack after safe storage at pack and grading house
Plum	Provide drainage			
Apricot	Provide drainage	-		
Pears	Provide drainage	-		
Nut and Dry fruits	Provide drainage	-		
Heavy rainfall with high speed winds in a short span[2]				
Pea	Provide drainage		Drain out Harvesting at physiological maturity	Grade and pack after safe storage at pack and grading houses
Tomato	Provide drainage			
Beans	Provide drainage			
Cucurbits	Provide drainage			

Cauliflower	Provide drainage			
Horticulture				
Apple	Provide drainage	Drain out excess water Use of shade nets		
Apricot	Provide drainage			
Plum	Provide drainage			
Nuts and dry fruit	Provide drainage			
Outbreak of pests and diseases due to unseasonal rains				
Capsicum				
Cabbage				
Tomato				
Beans				
Cucurbits				
Horticulture				
Apple				
Plum				
Apricot				
Pears				
Nut and Dry fruits				

2.3 Floods Not applicable

Condition	**Suggested contingency measure[o]**			
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 (It is found only in limited plain areas and has no frequent occurrence)
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[p]	Not applicable(It is found only in limited plain areas and has no frequent occurrence)			
Cold wave[q]				
Horticulture				
Apple Other temperate fruits	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 Placement of pollenizer bouquets	Proper packing and grading of fruits for safe storage and transportation to destination APMC's
Frost				
Pea Tomato	Grow seedling in low poly tunnels	Mist formation with light irrigation	Light irrigation	Removal of affected pods/fruits Proper packing & grading of fruits
Horticulture				
Apple Mango Litchi	Use shade nets Light irrigation in evening period	Mist formation with light irrigation Use of foggers	Light irrigation	Removal of injured pods/fruits Proper packing & grading of fruits
Hailstorm				
Pea Tomato Cucurbits cauliflower	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
Horticulture				

Apple Apricot Plum	Use of shade nets	Use of antihail nets	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
Cyclone	**Not applicable**			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event[s]	**During the event**	**After the event**
Drought			
Feed and fodder availability	Collect crop residues, collect tree fodder, use mangers, use chaff cutters , hay storage ,	Open grazing in forests and alpine slopes/ community lands and feeding of crop residues ; use of mangers and chaff cutters , feeding of household waste	Raising of fodder trees, replacement of unproductive animals with improved ones ,
Drinking water	Traditional water ponds , rivers	Stall drinking , rivers , traditional water ponds	Rejuvenation of water sources
Health and disease management	Local ethno pharmaceutical and modern medicines	Modern veterinary care , veterinary camps , insulation	Proper veterinary care , awareness , capacity building of locals, health care management
Floods	**NOT APPLICABLE**		
Feed and fodder availability			
Drinking water	**NOT APPLICABLE**		
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	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.	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[a]	**During the event**	**After the event**	
Drought				
Shortage of feed ingredients	No special preparations these are kept as backyard activity	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	
Drinking water	Met from the household supply	No impact as these is kept in captivity. Moreover these are kept as backyard and household waste is	Kept as backyard activity	

		sufficient for their keeping		
Health and disease management	Locally managed	Locally managed with the help of veterinary care	Kept as backyard activity and local health care is practiced	
Floods				
Shortage of feed ingredients	No Impact	No Impact	No Impact	No Impact
Drinking water				
Health and disease management				
Cyclone	No impact	No Impact	No Impact	No Impact
Shortage of feed ingredients	No impact			
Drinking water				
Health and disease management				
Heat wave and cold wave				
Shelter/environment management	Proper Ventilation	Proper aeration and fan , open spacing, water supply ,	Kept as backyard activity	
Health and disease management	Local	Local and Veterinary care	Kept as backyard activity	

[a] based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture : Not applicable as it is a supportive activity only

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**

1) Drought			
A. Capture			
Marine			
Inland	It is a supportive part time activity only		
(i) Shallow water depth due to insufficient rains/inflow	Regulate water supply	Control on capture	
(ii) Changes in water quality			
(iii) Any other			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Regulate water supply		
(ii) Impact of salt load build up in ponds / change in water quality		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.	
(iii) Any other			
2) Floods			
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 .		
(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			
(ii) Water contamination and changes in water quality	No specific action is taken as it is a supporting activity only and fishes are collected from natural ponds, rivers only .		
(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	Not applicable	Not applicable	Not applicable
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	No specific action is taken as it is a supporting activity only and fishes are collected from natural ponds, rivers only .		
Inland			
B. Aquaculture	Not applicable	Not applicable	Not applicable
(i) Changes in pond environment (water quality)			
(ii) Health and Disease management			
(iii) Any other			

[a] based on forewarning wherever available

Normal maize

Maize under draught conditions

Tomato under normal conditions

Tomato under draught conditions

Construction of LDPE-Lined water harvesting tanks