



भारतीय कृषि
ICAR

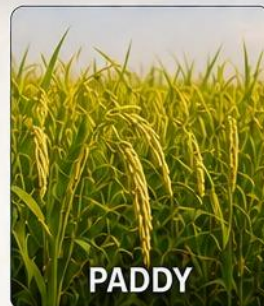
INDIAN COUNCIL OF
AGRICULTURAL RESEARCH

DISTRICT WISE CONTINGENCY PLAN TO DEAL WITH **EL NIÑO**

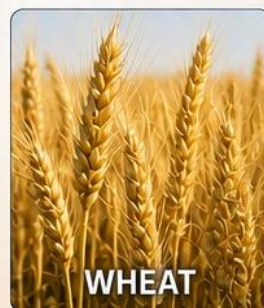
PREPAREDNESS | RESPONSE | RESILIENCE



BUILDING A
DROUGHT RESILIENT
HARYANA



PADDY



WHEAT



BAJRA



MAIZE



JOWAR



EARLY WARNING
& MONITORING



WATER
MANAGEMENT



SUSTAINABLE
AGRICULTURE



COMMUNITY
PARTICIPATION

TOGETHER, LET'S BUILD A RESILIENT HARYANA

PREPARE TODAY • PROTECT TOMORROW • PROSPER TOGETHER

Haryana

Haryana is a small but agriculturally significant state in north-western India and one of the most intensively cultivated states in the country. Agriculture is the primary economic activity in the state and serves as a major source of livelihood for a large section of the population. Haryana contributes disproportionately to the nation's food security, producing around 15–18% of India's wheat and 10–12% of its rice procured for the central pool. The state emerged as a key beneficiary of the Green Revolution during the 1960s and 1970s, with the widespread adoption of high-yielding crop varieties, chemical fertilizers, mechanization, and improved irrigation facilities. These advancements transformed Haryana into one of the leading producers of food grains in the country, particularly wheat and rice, making it a major contributor to the central food grain procurement system.

Haryana's agriculture is marked by intensive cultivation practices and high cropping intensity, making it one of the most productive agricultural systems in the country. The major cropping seasons are Kharif (June–October) and Rabi (October–April). Rice, cotton, pearl millet (bajra), maize, and pulses are the principal Kharif crops, while wheat, mustard, barley, gram, and other oilseeds dominate the Rabi season. The rice–wheat cropping system remains the most prevalent cropping pattern across the irrigated regions of the state.

Irrigation is the backbone of Haryana's agriculture, supported by one of India's most extensive canal networks such as the Western Yamuna Canal, Bhakra Canal, and an extensive network of tube wells providing groundwater irrigation to areas beyond canal reach. Haryana is most mechanised agricultural state, with tractors, combine harvesters, laser land levellers, and happy seeders widely deployed across its farms. These technologies have significantly reduced labour dependency, improved harvesting efficiency, and optimised irrigation water use. The adoption of happy seeders in particular has provided an environmentally responsible alternative to paddy stubble burning, allowing farmers to sow the next crop directly into crop residue without causing air pollution.

Chaudhary Charan Singh Haryana Agricultural University (CCSHAU), Hisar, which has played a pivotal role in developing climate-resilient crop varieties, conducting farmer training, issuing agro-meteorological advisories and disseminating advanced farming technologies. In recent years, the state has increasingly focused on crop diversification, micro-irrigation, integrated farming systems, and climate-resilient agricultural practices to enhance sustainability and resource-use efficiency.

Despite its significant contribution to agricultural production, Haryana faces critical challenges such as groundwater depletion, soil degradation, residue burning, and growing climate variability. In response, concerted efforts are being undertaken to promote crop diversification, sustainable resource management, efficient irrigation practices, and climate-smart agriculture to enhance productivity while ensuring the long-term sustainability and resilience of the state's farming systems."

Historical effect of El Nino in Haryana

El Niño has been a recurring climatic phenomenon affecting Haryana's agriculture through its influence on monsoon rainfall patterns. During El Niño years, the southwest monsoon often weakens, resulting in below-normal rainfall across the state during the Kharif season. Although Haryana benefits from extensive irrigation infrastructure, rainfall deficits increase dependence on groundwater resources and place additional stress on already declining water tables. Major El Niño events, including 1982–83, 1987, 2002, 2009, 2015, and 2023, were associated with deficient monsoon rainfall and reduced groundwater recharge in several parts of the state. The delayed arrival and erratic distribution of monsoon rains during these years frequently affected the timely sowing and establishment of major *Kharif* crops such as paddy, cotton, maize, and pearl millet (bajra).

Effect on major crops:

Paddy (Rice): Delayed monsoon and reduced rainfall affect nursery establishment and transplanting. Increased irrigation requirement and potential yield reduction of 8–15%.

Wheat: Terminal heat stress during grain filling reduces grain weight and productivity. Yield losses of 5–12% may occur under severe conditions.

Cotton: Moisture stress during flowering and boll development causes flower shedding, poor boll formation, and increased incidence of whitefly and bollworm.

Pearl Millet (Bajra): Prolonged dry spells during flowering and grain filling reduce grain formation and overall yield.

Maize: Moisture stress during germination, tasseling, and grain filling leads to poor crop establishment and reduced productivity.

Gram (Chickpea): Low soil moisture and elevated temperatures adversely affect flowering, pod formation, and grain filling.

Sugarcane: Water stress reduces tillering, cane growth, and sucrose accumulation, leading to lower cane yield and quality.

Vegetables: High temperatures and moisture stress affect flowering, fruit setting, quality, and marketable yield.

Contingency plans for major crops in Haryana

Major crop	Major contingency	Recommended measures
Paddy (Rice)	Delayed monsoon, drought, floods	Use short-duration varieties, transplant younger seedlings, maintain alternate wetting and drying irrigation, ensure quick drainage after waterlogging, and replant where necessary.
Wheat	Late sowing, frost, terminal heat	Use early-maturing and heat-tolerant varieties, timely sowing, balanced fertilization, protective irrigation during grain filling, and light irrigation before frost events.
Pearlmillet	Delayed rainfall, drought	Continue sowing up to late July or early August with drought-tolerant varieties (e.g., HHB-94, HHB-197, HHB-67 Improved), adopt intercropping with greengram or mothbean, and conserve soil moisture through mulching and interculture.
Cotton	Dry spells, floods, pest outbreaks	Follow moisture conservation, avoid water stagnation by drainage, monitor and manage sucking pests and pink bollworm, and use need-based irrigation.
Maize	Delayed irrigation	switch that land to moong, urad, or other short-duration pulses instead
Rapeseed and mustard	Late sowing, frost	Prefer timely sowing, use suitable varieties for delayed planting, provide lifesaving irrigation at flowering if needed, and protect against frost with light irrigation or smoke where feasible.
Cluster bean	Delayed onset of monsoon	Sow only up to mid-July under delayed rainfall; beyond that, shift to more suitable short-duration crops.
Sugarcane	Delayed onset of monsoon	Mulch between irrigations to conserve moisture; prioritize ratoon cane for available water first

Haryana is one of India's most agriculturally advanced states and plays a vital role in ensuring national food security. However, recurring El Niño events increase the risk of

delayed monsoon, drought, heat stress, and moisture deficiency, adversely affecting the productivity of major crops such as paddy, wheat, cotton, maize, pearl millet, and sugarcane. These climatic challenges also intensify pressure on the state's already declining groundwater resources. Effective crop contingency planning through the adoption of short-duration and drought-tolerant varieties, timely sowing, efficient irrigation, soil moisture conservation, crop diversification, and integrated pest management can significantly reduce production losses. Continued support from CCS Haryana Agricultural University, ICAR, and state extension agencies through weather-based advisories and climate-resilient technologies will further strengthen farmers' adaptive capacity. Promoting climate-smart and sustainable agricultural practices is therefore essential to enhance the resilience, productivity, and long-term sustainability of Haryana's agriculture under increasing climate variability.

Area under major crops

Crop	Area (Lakh ha)
Paddy	16.09
Wheat	23.88
Bajra	5.74
Maize	0.04
Jowar	0.19

Districts vulnerable to El Nino

High	Medium	Low
Nil	Nil	Panchkula, Ambala, Yamuna- Nagar, Gurgaon, Kurukshetra

Actionable Comprehensive Plans for Contingency

State	HARYANA	District	AMBALA
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	820.7	More than 19%	Less than 664.767
June	117.9		
July	285.8		
August	244.5		
September	172.5		

Forecast probability for the season (as per IMD): Below Normal

Irrigation info:

Net irrigated area:	145891	Gross irrigated area:	260256
Net Rainfed area	2595	Gross rainfed area	4630

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	2900	5173
Wells	142991	255083
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	106591	106591	0
2	Jowar	12	12	0
3	Maize	4852	4852	0
4	Bajra	50	50	0
5	Ragi	-		

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	-		
2	Groundnut	-		
3	Sesamum	-		
4	SOyabean	-		
5	Sunflower	21474	21474	0
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	-		
2	Jute	-		
3	Mesta	-		
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	8584	8584	0
2	Tobacco	-		
3	Guar seed	-		4630
4	Other Fodder crops	11232	6602	4630

Crop Plan- Beginning of the season

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 4 weeks (Specify month)			NA		

Contingency measures- Mid season

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage			NA		

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At reproductive stage	NA				

Contingency measures- End of the season

Condition			Suggested Contingency measures		
Terminal drought	Major Farming situation	Crop/cropping system	Crop management	Rabi crop planning	Remarks on Implementation
	NA				

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	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	Use 10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Marginal ground waters for life saving irrigation Short duration cultivars, Adoption of plant protection measures. Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-Wheat	None	-do-	-do-
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	-do-	-do-
		Maize-Wheat	None	-do-	-do-
		Sugarcane	Intercropping of Onion/Garlic with Sugarcane	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters Short duration cultivars, Adoption of plant protection measures, Weed free environment	-do-

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars. Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-Wheat	None	-do-	-do-
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	-do-	-do-
		Maize-Wheat	None	-do-	-do-
		Sugarcane	Intercropping of Onion/Garlic with Sugarcane	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars. Adoption of plant protection measures, Weed free environment	-do-

Condition			Suggested Contingency measures		
	Major Farming situation	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	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell			Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	systems and laser leveler
		Maize-wheat	None	-do-	-do-
		Rice-wheat	No change	-do-	-do-
		Maize-wheat	None	-do-	-do-
		Sugarcane	Intercropping of Onion/Garlic with Sugarcane	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters. Short duration cultivar. Adoption of plant protection measures Weed free environment	-do-

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-wheat	None	As above	As above
		Sugarcane	Intercropping of Onion/Garlic with Sugarcane	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment	irrigation systems and laser leveler
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-wheat	None	As above	As above
		Sugarcane	Intercropping of Onion/Garlic with Sugarcane	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation Conjunctive use of brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler

Resource management technologies

- Crop residue recycling in wheat with Happy Seeder
- Laser Land Levelling in paddy for levelling, smoothing and shaping the field surface
- Direct seeding of rice to conserve resources and minimize the impact of weather aberrations
- Zero tillage in wheat to avoid delay in planting and reduce the cost of production
- Drip irrigation in different crops
- Straw mulching

Actionable Comprehensive Plans for Contingency

State	HARYANA	District	GURGAON
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	489.2	More than 19%	Less than 396.252
June	47.1		
July	170.9		
August	172.9		
September	98.3		

Forecast probability for the season (as per IMD): Below Normal

Irrigation info:

Net irrigated area:	57098	Gross irrigated area:	150358
Net Rainfed area	0	Gross rainfed area	0

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	-	-
Wells	57098	150358
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	3787	3787	0
2	Jowar	371	371	0
3	Maize	2	2	0
4	Bajra	41547	41547	0
5	Ragi	-		

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	-		
2	Groundnut	-		
3	Sesamum	195	195	0
4	SOyabean	-		
5	Sunflower	-		
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	1884	1884	0
2	Jute	-		
3	Mesta	-		
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	-		
2	Tobacco	-		
3	Guar seed	25		0
4	Other Fodder crops	43163	43163	0

Crop Plan- Beginning of the season

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
Delay by 4 weeks (August 1 st week)	Light textured sandy soils susceptible to wind erosion	Pearl millet	Don't grow Clusterbean beyond mid July.	No change	
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)		No change	
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with Pearlmillet as above.		No change	

Contingency measures- Mid season

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

consecutive 2 weeks rainless (>2.5 mm) period)				conservation measures	
At vegetative stage	Light textured sandy soils susceptible to wind erosion	Pearl millet	- Weeding and hoeing with <i>wheel hand hoe/ kasola</i> as and when required. - Thinning to reduce 1/3rd population.	<i>In-situ/ex-situ</i> moisture conservation: i) Apply life saving irrigation of 4-5 cm, if possible. ii) Foliar spray of urea (2.5 % at 30-35 DAS).	- Release of irrigation water in canals and proper power supply may be insured by concerned departments - subsidy on sprinkler, drip irrigation systems and laser leveler
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)	- Don't use chemicals for weed management under stress. - Weeding and hoeing with wheel hand hoe/ kasola as and when required.	Apply life saving irrigation of 4-5 cm, if possible. Straw mulching in between rows.	
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with pearlmillet as above.	- Don't use chemicals for weed management under stress. - Weeding and hoeing with wheel hand hoe/ kasola as and when required.	-do-	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Normal Crop /cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At reproductive stage	Light textured sandy soils susceptible to wind erosion	Pearl millet	- Remove every third row for green fodder. - Life saving irrigation if available.	Make ridge and furrow for rain water harvesting	-
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)	-do-	-do-	-
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with Pearl millet as above.	-do-	-do-	-

Contingency measures- End of the season

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

	Light textured sandy soils susceptible to wind erosion	Pearl millet	- Remove every third row for green fodder. - Make ridge and furrow for rain water harvesting. - Life saving irrigation if available. - Foliar spray of urea 2% solution	- Field preparation for rabi crop sowing during first fortnight of October - Sowing of Mustard (RH-30, RH -819, RB-24, RB 50 RH- 781 and Varuna) and Chickpea (C-235, H-208 and HC-1) during second fortnight of October	The State Agriculture Department should have advance arrangements for timely supply of seed, fertilizer and other agro-inputs to farmers at block level. Breeder seed: Dept of Plant Breeding, CCSHAU, Hisar
		Pearl millet + Greengram / Mothbean (Intercropping 8:4/6:3)	-do-	-do-	
		Clusterbean Cowpea Castor Sesame Clusterbean can also intercropped with Pearlmillet as above.	-do-	-do-	

Irrigated Situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed/ limited release of water in canals due to low rainfall	Sandy soils/sandy loam soils canal irrigated	Pearlmillet-Wheat	Pearlmillet+Moong - Raya	10-15% higher seed rate, Sprinkler irrigation - Planting on beds, planting with ridge seeder, Laser land leveling, Conjunctive use of canal and ground waters. - Split application of fertilizers - Straw mulching - Marginal ground waters for life saving irrigation, - Short duration cultivars - Soaking of wheat seeds before sowing - Seed treatment with Azotobactor/Rhizobium, - Deep ploughing during kharif season, Shallow irrigation of 4-5 cm depth, - Weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Pearlmillet-Chickpea	Clusterbean-Barley	-do-	
		Fallow -Raya	Summer Moong-Raya	- Short duration cultivars - Seed treatment with Azotobactor/Rhizobium, - Straw mulching - Sprinkler irrigation, Planting on beds, planting with ridger seeder, land leveling	

				• Conjunctive use of canal and ground water • Marginal ground waters for life saving irrigation, Weed free environment	
	Well drained, medium alluvial soils, canal irrigated	Clusterbean-Wheat	Cotton-Wheat	• Drip/furrow irrigation in Cotton, paired row planting • Sprinkler in wheat, Planting on beds, Straw mulching in cotton, Planting on beds Planting with ridger seeder • Laser land leveling, Split application of fertilizer, Straw mulching in sugarcane, Marginal ground waters for life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars • Soaking of wheat seeds before sowing, Seed treatment with azotobactor/rhizobium, Deep ploughing during <i>kharif</i> season, Shallow irrigation of 4-5 cm depth, Sowing of vegetable seeds in polythene bags and replanting them in holes, Weed free environment	Seeds from State, national and private seed agencies seed agencies, The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler and drip irrigation systems, on laser land leveling
		Pearlmillet/-Wheat	Pearlmillet-Raya/Chickpea	• Paired row planting, Sprinkler irrigation. Planting on beds • Straw mulching, Laser land leveling, Split application of fertilizer, Straw mulching, Marginal ground waters for life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars, seed treatment with azotobactor/rhizobium, Deep ploughing during <i>kharif</i> season, Shallow irrigation of 4-5 cm depth • Weed free environment	
		Cotton-Wheat	No change	• Drip/furrow irrigation in cotton, paired row planting • Planting on beds, Straw mulching in cotton, Laser land leveling, Split application of fertilizer, • Marginal ground waters for life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars • Weed free environment	
		Pearlmillet/Fallow-Raya	Vegetables	Seed treatment with Azotobactor, Deep ploughing during kharif season, Shallow irrigation of 4-5 cm depth, Sowing of vegetable seeds in	

				polythene bags and replanting them in holes.	
	Clay soils, canal irrigated	Rice-Wheat	Summer Moong-Rice	Sprinkler irrigation in moong, Planting on beds Laser land leveling Late sown cultivars, Short duration Desi wheat and Basmati rice.	Seeds from State and national seed agencies, The schemes of NREGS, RKRY, NFSM, NHM are in operation. Seed from private seed agencies
		Cotton-Wheat	None	Drip/furrow irrigation in cotton, paired row planting, Planting on beds, Straw mulching in cotton, Laser land leveling Split application of fertilizer, Marginal ground waters for life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars, Weed free environment	
		Sorghum fodder-wheat	Vegetables/flowers	Sprinkler/drip irrigation, Planting on beds, laser land leveling, Mulching in inter-row spacing Use of marginal ground waters as life saving irrigation	

Condition	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Sandy soils, canal tubewell irrigated	Pearlmillet-Raya	Pulses-Raya	- Planting on beds Sprinkler irrigation, Marginal ground waters for life saving irrigation, Laser land leveling - Straw mulching, Paired row planting, - Split application of fertilizer, Straw mulching, - Marginal ground waters for life saving irrigation, Conjunctive use of brackish ground waters with canal waters, - Short duration cultivars - Seed treatment with azotobactor/rhizobium, Deep ploughing during <i>kharif</i> season, Shallow irrigation of 4-5 cm depth, Weed free environment	Seeds from State, national and private seed agencies seed agencies, The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler and drip irrigation systems, on laser land leveling
		Pearlmillet-Chickpea	Clusterbean-Barley	-do-	
		Fallow – Raya/Barley	Vegetables-Raya	-do- Sowing of vegetable seeds in polythene bags and replanting them in holes. Drip irrigation in vegetables	
	Well drained, medium alluvial soils, canal irrigated	Clusterbean-Barley	Cotton-Wheat	Drip/furrow irrigation in cotton, Sprinkler in wheat, Planting on beds, Laser land leveling, Limited ground water use, prefer life saving irrigation, Conjunctive use of ground water Shallow irrigation of 4-5 cm depth, Weed free environment	
		Pearlmillet/fallow-Wheat	Pearlmillet-Raya/Chickpea	Paired row planting, Sprinkler irrigation, Planting on beds	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				- Straw mulching, Laser land leveling, Split application of fertilize, Straw mulching, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars, Seed treatment with azotobactor/rhizobium, Deep ploughing during kharif season, Shallow irrigation of 4-5 cm depth - Weed free environment. Short duration cultivars of crops - Conservation of rain water, mulching, rain water harvesting.	
		Pearlmillet/fallow-Raya	Sugarcane+Moong intercropping	- Drip/furrow irrigation in sugarcane, paired row planting - Planting on beds, Straw mulching in sugarcane, - Laser land leveling, - Split application of fertilizer, - Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters, Short duration cultivars - Weed free environment.	
		Cotton-Wheat	No change	-do-	
	Clay soils, canal irrigated	Cotton-Wheat	No change	-do-	Seeds from State, national and private seed agencies seed agencies, The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler and drip irrigation systems, on laser land leveling
		Fallow --Raya	Sugarcane-Mungbean intercropping	-do-	
		Sorghum fodder-Wheat	Vegetables/ flowers	- Sowing of vegetable seeds in polythene bags and replanting them in holes. - Drip irrigation in vegetables, Planting on beds - Straw mulching, Laser land leveling, Split application of fertilizer, Limited ground water use, prefer life saving irrigation - Conjunctive use of brackish ground waters with canal waters, - Seed treatment with azotobactor /rhizobium - Weed free environment.	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed	Sandy soils, canal/ tubewell irrigated	Pearlmillet-Wheat	Clusterbean-Wheat	Planting on beds, sprinkler irrigation/drip irrigation Limited ground water use, prefer life saving irrigation	Short duration cultivars of crops, Shallow ground water use alone or in combination, Conservation of rain water, mulching, and rain water harvesting,
		Sorghum-Wheat	Sugarcane-Wheat/Raya		
		Pearlmillet-Chickpea	Fallow-Raya		

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
onset of monsoon	Well drained, medium alluvial soils, canal/ tubewell irrigated	Rice-Wheat	Pearlmillet-Chickpea	Drip/furrow irrigation in cotton, sprinkler in wheat, planting on beds, Sprinkler irrigation, Planting on beds, planting with ridger seeder, laser land leveling Limited ground water use, prefer life saving irrigation	As above
		Cotton-Wheat	None		
		Rice- Berseem (fodder)	Cotton-Wheat		
	Clay soils, canal/ tubewell irrigated	Pigeon pea – Wheat/Barley	Summer Moong-Wheat	Drip irrigation, paired row planting of cotton, Planting on beds, Shallow irrigation in vegetable and straw mulching, Conjunctive use of ground water, Use of gypsum for reclaiming sodic waters, Limited ground water use, prefer life saving irrigation	As above
		Cotton-wheat	None		
		Sorghum fodder-Wheat	Vegetables/ Flowers		

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measure	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Sandy soils, tubewell irrigated	Pearlmillet-Barley	Clusterbean-wheat	Adoption of efficient methods of irrigation viz., drip in wide spaced, vegetables and horticultural crops Sprinkler irrigation in other crops	Seeds from State, national and private seed agencies seed agencies, The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler and drip irrigation systems, on laser land leveling
		Fallow-Raya (Mustard)	Sugarcane-wheat/Raya		
		Pearlmillet-Chickpea	Fallow-Raya (Mustard)		
	Well drained, medium alluvial soils, tubewell irrigated	Rice-Wheat	Pearlmillet-Chickpea		
		Cotton-Wheat	Pigeonpea-Wheat		
		Rice-Berseem(fodder)	Cotton-Wheat		
	Clay soils, tubewell irrigated	Pigeonpea – Wheat/Barley	Clusterbean-Raya		
		Pearlmillet– Raya/Chickpea	Planting on beds		
		Sorghum fodder-Wheat	Cucurbits-Raya		

Resource management technologies

- Crop residue recycling in wheat with Happy Seeder
- Laser Land Levelling in paddy for levelling, smoothing and shaping the field surface
- Direct seeding of rice to conserve resources and minimize the impact of weather aberrations
- Zero tillage in wheat to avoid delay in planting and reduce the cost of production
- Drip irrigation in different crops
- Straw mulching

Actionable Comprehensive Plans for Contingency

State	HARYANA	District	KURUKSHETRA
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	413.9	More than 19%	Less than 335.259
June	61.7		
July	134		
August	119.7		
September	98.5		

Forecast probability for the season (as per IMD): Below Normal

Irrigation info:

Net irrigated area:	164538	Gross irrigated area:	283577
Net Rainfed area	0	Gross rainfed area	0

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	28000	48257
Wells	136538	235320
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	125254	125254	0
2	Jowar	-	-	
3	Maize	3688	3688	0
4	Bajra	-		
5	Ragi	-		

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	-		
2	Groundnut	-		
3	Sesamum	-		
4	SOyabean	-		
5	Sunflower	10987	10987	0
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	-		
2	Jute	-		
3	Mesta	-		
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	9200	9200	0
2	Tobacco	-		
3	Guar seed	-		0
4	Other Fodder crops	5474	5474	0

Crop Plan- Beginning of the season

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 4 weeks (Specify month)	NA				

Contingency measures- Mid season

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage	NA				

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At reproductive stage	NA				

Contingency measures- End of the season

Condition			Suggested Contingency measures		
Terminal drought	Major Farming situation	Crop/cropping system	Crop management	Rabi crop planning	Remarks on Implementation
	NA				

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	Upland Alluvial soils heavy textured, canal irrigated	Rice-wheat	No change	10-15% higher seed rate, - optimum plant spacing - Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, - Conjunctive use of canal and ground waters. - Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation - Short duration cultivars, - Adoption of plant protection measures - Soaking of wheat seeds before sowing, seed treatment with biofertilizer , deep ploughing during <i>kharif</i> season - Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Sugarcane	No change	- Drip/Furrow irrigation in Sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching - Laser land leveling - Intercultural operation and earthing up, Limited ground water use, prefer life saving irrigation - Conjunctive use of brackish ground waters with canal waters - Short duration cultivars - Adoption of plant protection measures - Weed free environment	-do-
Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals	Upland Alluvial soils heavy	Rice-wheat	No change	Follow measures given for Rice- wheat cropping system for Delayed/limited release of water in canals	Seeds from State, national seed and private seed agencies. The

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
under delayed onset of monsoon in catchment	textured, canal irrigated				schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler.
		Sugarcane	No change	Follow measures given for Sugarcane for Delayed/limited release of water in canals	-do-

Condition			Suggested Contingency measures		
	Major Farming situation	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				NA	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Upland Alluvial soils, tube well irrigated	Rice-wheat	Maize-wheat	Follow measures given for Rice- wheat cropping system for Delayed/limited release of water in canals	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Sugarcane	No change	Follow measures given for Sugarcane for Delayed/limited release of water in canals	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler

Resource management technologies

- Crop residue recycling in wheat with Happy Seeder
- Laser Land Levelling in paddy for levelling, smoothing and shaping the field surface
- Direct seeding of rice to conserve resources and minimize the impact of weather aberrations
- Zero tillage in wheat to avoid delay in planting and reduce the cost of production
- Drip irrigation in different crops
- Straw mulching

Actionable Comprehensive Plans for Contingency

State	HARYANA	District	PANCHKULA
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	861.7	More than 19%	Less than 697.977
June	106.8		
July	284.8		
August	293.9		
September	176.2		

Forecast probability for the season (as per IMD): Below Normal

Irrigation info:

Net irrigated area:	17786	Gross irrigated area:	38162
Net Rainfed area	4185	Gross rainfed area	8979

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	-	-
Wells	17786	38162
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	14039	14035	4
2	Jowar	-	-	
3	Maize	3654	495	3159
4	Bajra	531	417	114
5	Ragi	-		

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	2		2
2	Groundnut	4		4
3	Sesamum	14	2	12
4	SOyabean	-		
5	Sunflower	784	784	0
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	-		
2	Jute	-		
3	Mesta	-		
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	479	408	71
2	Tobacco	-		
3	Guar seed	3		1896
4	Other Fodder crops	4631	2735	1896

Crop Plan- Beginning of the season

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 4 weeks	NA				

Contingency measures- Mid season

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage	NA				

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At reproductive stage	NA				

Contingency measures- End of the season

Condition			Suggested Contingency measures		
Terminal drought	Major Farming situation	Crop/cropping system	Crop management	Rabi crop planning	Remarks on Implementation
	NA				

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	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching,	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation.

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
in catchment				Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	

Condition			Suggested Contingency measures		
	Major Farming situation	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	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters.	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation, Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation, Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-Wheat	None	As above	
	Medium clay loam soil with	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
	tubewell/canal irrigated condition prominently tubewell			Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-Wheat	None	As above	

Resource management technologies

- Crop residue recycling in wheat with Happy Seeder
- Laser Land Levelling in paddy for levelling, smoothing and shaping the field surface
- Direct seeding of rice to conserve resources and minimize the impact of weather aberrations
- Zero tillage in wheat to avoid delay in planting and reduce the cost of production
- Drip irrigation in different crops
- Straw mulching

Actionable Comprehensive Plans for Contingency

State	HARYANA	District	YAMUNA-NAGAR
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	896.5	More than 19%	Less than 726.165
June	125.2		
July	309.9		
August	291.1		
September	170.3		

Forecast probability for the season (as per IMD): Below Normal

Irrigation info:

Net irrigated area:	115804	Gross irrigated area:	221751
Net Rainfed area	1078	Gross rainfed area	2065

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	1790	3428
Wells	114014	218323
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	87711	87711	0
2	Jowar	-	-	
3	Maize	108	92	16
4	Bajra	145	5	140
5	Ragi	-		

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	-		
2	Groundnut	1		1
3	Sesamum	25	17	8
4	SOyabean	-		
5	Sunflower	260	260	0
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	-		
2	Jute	-		
3	Mesta	-		
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	18454	18454	0
2	Tobacco	-		
3	Guar seed	5		1899
4	Other Fodder crops	8274	6375	1899

Crop Plan- Beginning of the season

Condition			Suggested Contingency measures		
Early season drought (Normal onset)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	NA				

Contingency measures- Mid season

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation

(>2.5 mm) period)					
At vegetative stage	NA				

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At reproductive stage	NA				

Contingency measures- End of the season

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Crop management	Rabi crop planning	Remarks on Implementation
Terminal drought	NA				

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	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-wheat	Maize-wheat	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Sugarcane	Intercropping of Onion/Garlic with Sugarcane	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				saving irrigation, Conjunctive use of brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment	
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Sugarcane	Intercropping of Onion/Garlic with Sugarcane	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-wheat	Maize-wheat	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-wheat	None	10-15% higher seed rate, optimum plant spacing	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Sugarcane	Intercropping of Onion/Garlic with Sugarcane	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment	

Condition			Suggested Contingency measures		
	Major Farming situation	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	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-wheat	Maize-wheat	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-wheat	None	10-15% higher seed rate, optimum plant spacing	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Sugarcane	Intercropping of Onion/Garlic with Sugarcane	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
	Insufficient groundwater recharge due to low rainfall	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-wheat	Maize-wheat	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
				10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
			Maize-wheat	None	
				As above	
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-wheat	None	As above	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
		Sugarcane	Intercropping of Onion/Garlic with Sugarcane	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment	

Resource management technologies

- Crop residue recycling in wheat with Happy Seeder
- Laser Land Levelling in paddy for levelling, smoothing and shaping the field surface
- Direct seeding of rice to conserve resources and minimize the impact of weather aberrations
- Zero tillage in wheat to avoid delay in planting and reduce the cost of production
- Drip irrigation in different crops
- Straw mulching