

AGRICULTURE CONTINGENCY PLAN

DISTRICT: KEONJHAR

STATE: ODISHA



KRISHI VIGYAN KENDRA, KEONJHAR

AT / PO: JUDIA FARM, OLD TOWN, KEONJHAR – 758002

ORISSA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

BHUBANESWAR - 751003

State: Odisha

Agriculture Contingency Plan: Keonjhar District

1.0 District Agriculture profile					
1.1	Agro-Climatic/ Ecological Zone				
	Agro Ecological Sub Region (ICAR)	Eastern plateau (chhotanagpur) and Eastern Ghats, Hot Sub humid Eco-Region(12.3)			
	Agro-Climatic Region/Zone (Planning Commission)	Eastern Plateau & Hills Region-VII			
	Agro Climatic Zone (NARP)	North Central Plateau Zone (OR-2)			
	List all the districts falling under the NARP Zone (* > 50% area falling in the zone)	Mayurbhanj, Major parts of Keonjhar (Except Anadpur & Ghasipura block)			
	Geographical coordinates of district	Latitude	Longitude	Altitude	
		21 ⁰ 37 ^{48.00} North	85 ⁰ 34 ^{48.00} East	533 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	RRTTS, Keonjhar, At/Po/-Judia Farm, Old Town, Dist-Keonjhar, Odisha, Pin-758002			
	Mention the KVK located in the district	Krishi Vigyan Kendra, Keonjhar, At/Po/-Judia Farm, Old Town, Dist-Keonjhar, Odisha, Pin-758002			
	Name & Address of nearest Agromet field unit	Agromet Advisory Service, Judia Farm, Keonjhar			
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)	1144.1	54.6	2 nd Week of June	Last Week of September
	NE Monsoon (Oct-Dec)	125.2	6.5	1 st week of October	1 st week of December
	Winter (Jan-March)	48.4	3.0		
	Summer (Apr-May)	170.0	10.9		
	Annual	1487.7	75.0		

1.3	Land use pattern of the district (latest statistics)	Geographical area	Forest area	Cultivated 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 (000ha)	830	310	298	77	20	26	06	93	53	0

Source: Orissa Agricultural Statistics, 2012-13

1.4	Major Soils (common names like red sandy loam deep soils (etc.))**	Area ('000 ha)	Percent (%) of total
	Red soils	342.0	41.2
	Lateritic soils	241.0	29
	Alluvial soils	91.4	11
	Mixed red & yellow soils	83.0	10
	Mixed red & black soils	73.0	8.8
	Others (specify):	-	
1.5	Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	245	161
	Area sown more than once	150	
	Gross cropped area	393.33	
	Kharif cropped area	275.85	
	Rabi cropped area	94.58	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	82.4		
	Gross irrigated area	120.88		
	Rainfed area	227		
	Source of irrigation	Number	Area ('000 ha)	
	Canals	-	-	
	Tanks	3	27.2	
	Open wells	2792	4.4	
	Bore wells	20205	8.1	
	Lift irrigation	235	3.3	
	Micro-irrigation	-	-	
	Other sources	-	7.5	
	Total Irrigated area			
	Pumpsets	-	-	
	No. of Tractors	-	-	
	Groundwater availability and use	No. of blocks	% area	Quality of water
	Over exploited	-	-	-
	Critical	-	-	-
	Semi-critical	-	-	-

	Safe	-	-	-
	Wastewater availability and use	-	-	-

*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%

Area under major field crops & horticulture etc. (2017-18) Area (in '000 ha)

1.7	Field crops-	Irrigated (in ha)		Rainfed(in ha)	
		Kharif	Rabi	Kharif	Rabi
	Rice	52.8	2.0	152.3	-
	Maize	1.1	0.2	26.2	-
	Blackgram	-	0.2	18.3	6.4
	Horsegram	-	-	-	15.8
	Niger	-	-	14.2	1.5
	Greengram	-	0.1	7.5	6.7
	Horticulture crops-				
	Fruits				
	Mango	7.7			
	Cashew	3.8			
	Horticulturecrops - Vegetables				
	Brinjal	11.7			
	Tomato	15.0			
	Radish	7.7			
	Chilli	3.8			
	Cashewnut		3.8		
	Coconut		1.2		
	Eucalyptus		3.8		
	Sericulture etc			680ha (Production3.52lakhcocon)	

*If break-up data (irrigated, rainfed) is not available, give total area

Source: Orissa Agricultural Statistics, 2008-09

1.8	Livestock*	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	-	-	144.8
	Improved cattle	-	-	-
	Cross bred cattle	-	-	122.7
	Non descriptive Buffaloes (local low yielding)	-	-	-
	Descript Buffaloes	-	-	613.5
	Goat	-	-	519.0
	Sheep	-	-	104.5
	Others (Pig,etc.)	-	-	699.8
1.9	Poultry*	No. of farms	Total No. of birds ('000)	
	Commercial	NA	1026.1	
	Backyard	NA	210.0	
1.10	Inland Fisheries**	Water Spread Area (ha)	Yield (t/ha)	Production (tones)
	Brackish water			
	Freshwater (Data Source: Fisheries Department)	3255.90	2.7	8725.8
	Others Capture(Rivers, Canal, Reels & Swamps)			
	Marine Capture(Continual shelf area)			

Source: * Report of Dept. of Animal Resource Development, Keonjhar, 2009

** Report of Dept. of Fisheries. 2017-18

1.11	Production and Productivity of major crops	Kharif		Rabi		Summer		Total	
		Production ('000 t)	Productivity(kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
	Paddy	415.76	1996			5.45	2696	421.21	2003
	Maize	28.19	1035	0.22	1169			28.41	1036
	Blackgram	6.41	350	2.96	445			9.37	375
	Horsegram	-	-	7.04	445			7.40	445
	Niger	3.57	252	0.41	285			3.98	255

	Greengram	3.44	460	3.12	458			6.56	459
	Mango					10.83	141	10.83	141
	Guava	9.537	646					9.537	646
	Citrus	11.365	773					11.365	773
	Tomato			201.763	1339			201.763	1339
	Brinjal	190.481	1630					190.481	1630
	Sweet potato	24.354	900					24.354	900

Source: Orissa Agricultural Statistics, 2008-09

1.12	Sowing window for 5 major crops (start and end of sowing period)	Rice	Maize	Pulses (Blackgram)	Niger	Vegetables
	Kharif-Rainfed	2nd week of June-1st Week of July	1st week of June-1st Week of July	2nd week of June-1st week Of July	2nd week of August-1st week of September	2nd week of June-2nd week of July
	Kharif-Irrigated	2nd week of July-1st Week of August	2nd week of June to 4th Week of June	-	-	2nd week of June-2nd week of July
	Rabi-Rainfed	-	-	1st week of Oct-2nd week Of Dec	1st week of Oct-2nd Week of Oct.	-
	Rabi-Irrigated	-	3rd week of Dec-1st Week of Jan	-	2nd week of Nov-1st Week of Dec	1st week of Oct-3rd week of Nov
	Summer-Irrigated	2nd week of June-1st Week of July	1st week of June-1st Week of July	2nd week of June-1st week Of July	2nd week of August-1st week of September	2nd week of June-2nd week of July

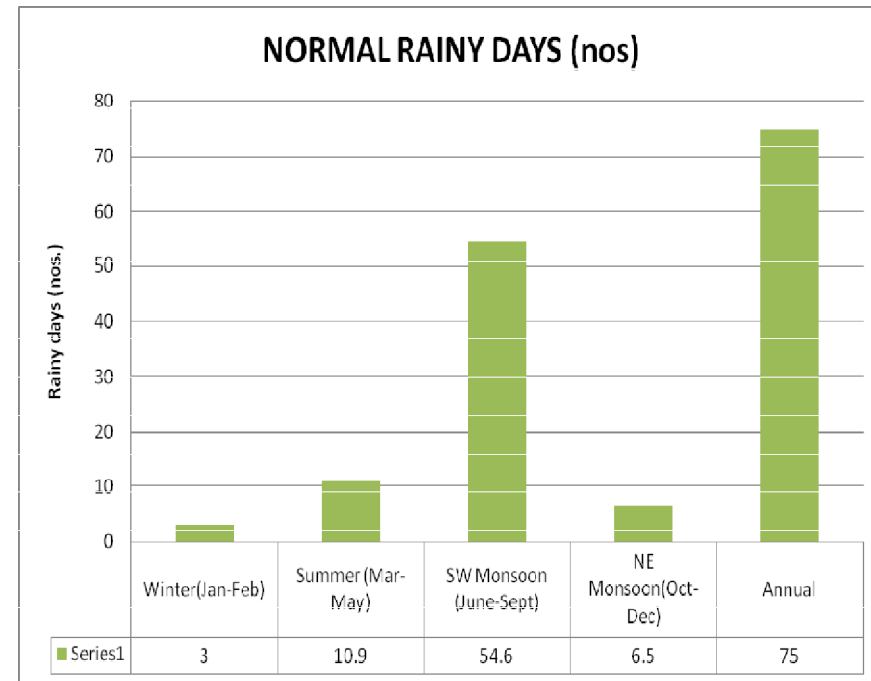
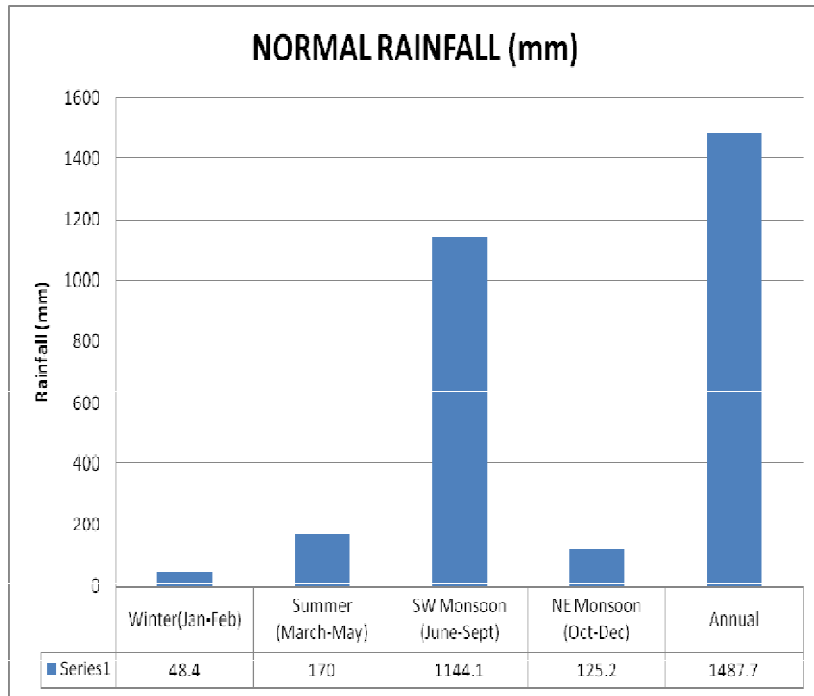
1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought		✓	
	Flood		✓	
	Cyclone		✓	

Hail storm	✓		
Heat wave	✓		
Cold wave		✓	
Frost			✓
Sea water inundation			✓
Pests and diseases (specify)	✓		

1.14	Include Digital maps of the district for	Location map of district with in States as Annexure 1	Enclosed: Yes / No - Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes / No - Yes



Annexure 1 : Location Map of district



Annexure 2 : Mean Annual Rainfall

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency Measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) June 4 th week	Medium elevation medium rainfall Lateritic soil Upland	Rice-Fallow	<ul style="list-style-type: none"> ➤ Growing short duration varieties like SahabhaziDhan, Kalinga , Sneha, Pathara, ➤ Intercropping like Rice + Arhar (5:2), Rice + Greengram / Blackgram (3:1), Rice + Radish (4:2) ➤ Grow improved variety of intercrop ➤ Arhar:PRG-176,UPAS-120 ➤ Blackgram: IPU-2-43, Pant U-19 & 30, Ujala, Sarala, Prasad ➤ Greengram: IPM 2-14, Sujata,Durga,PDM-11&54 ➤ Radish: Pusa Chetki, Delhi White 	<ul style="list-style-type: none"> ➤ Application of FYM /Organic manure at the time of final land preparation to increase the WHC of soil. ➤ Application of lime @ 5q / ha mixed with 5 ton FYM in furrows at the time of sowing in acid soil for better root development ➤ Seed priming, bio-fertilizer inoculation ➤ In-situ soil water conservation measures like ploughing and sowing across the slope, contour farming, strip cropping ➤ Convert un-bunded uplands to bunded uplands ➤ Adoption of tree based farming system with plantation of Acacia mangium, Gmelina arborea, Leucaenal eucocephla, L.diversifolia, Glarycidia sp, Anonas qumosa etc in the field bunds and alleys 	
		Rice-Blackgram/Horsegram	<ul style="list-style-type: none"> ➤ Growing short duration varieties like SahabhaziDhan, Kalinga ➤ Intercropping like Rice + Greengram /Blackgram (3:1) 	-do-	

			<ul style="list-style-type: none"> ➤ Grow improved variety of intercrop ➤ Blackgram: IPU2-43, Pant U-19 &30,Ujala,Sarala, Prasad ➤ Greengram: IPM 2-14 Sujata, Durga, PDM-11&54 ➤ Followed by improved variety of Horse gram (Urmi), Blackgram(Pant U-19 & 30,Ujala, Sarala, Prasad) 		
		Maize-Toria	<ul style="list-style-type: none"> ➤ Maize based intercropping like Maize + cowpea (2:2), Maize+ Runner bean (2:2), ➤ Take early maturing varieties like Navjot, Kiran,VL16, DHM-109 ➤ Cowpea: SEB-2, Utkal Manik ➤ Runner bean :Suphala ➤ Improved Toria variety like M-27, Anuradha 	<ul style="list-style-type: none"> ➤ Ploughing and sowing across the slope ➤ Application of FYM / Organic manure at the time of final land preparation to increase the WHC of soil. ➤ Application of lime @ 5q / ha mixed with FYM in furrows at the time of sowing in acid soil for better root development ➤ Bio-fertilizer inoculation ➤ Seed treatment with CaCl₂ solution 0.2% for 20 hours for improving drought resistance in plants ➤ Ridge and furrow method of planting. ➤ Application of FYM to increase the WHC of soil. At the time of final land preparation ➤ Adoption of tree based farming system with plantation of Acacia mangium, Gmelina arborea, Leucaena leucocephala L. diversifolia, Gliricidia sp, Ananas quamosa etc in the field bunds and alleys 	

Medium land/Lowland	Rice-Chickpea / Fieldpea / Lentil	<ul style="list-style-type: none"> ➤ Selection of short duration variety like Lalat, Manaswini, Naveen, MTU1010, Konark, and Surendra ➤ Bund planting with Arhar, Cowpea, Greengram, Blackgram etc. ➤ Growing Fieldpea (Rachana), Lentil and Chickpea (Ujjawal/JG11) after paddy as paira crop or relay crop. ➤ Adopt agroforestry with bund plantation with Gmelina arborea, Leucaenal eucocephla, L. diversifolia, Glarycidia sp, Anonas qumosa etc ➤ Grow grasses like Stylosanthes, Dinanath grass etc. in the field bunds for fodder purpose 	<ul style="list-style-type: none"> ➤ Raising community nursery inthe vicinity of water sources like village tanks ➤ Application of fertilizer and vermicompost /bio-fertilizer in the nursery for early seedling growth and sowing of pre-germinated seed. ➤ Application of FYM to increase the WHC of soil. ➤ Repair field bunds to protect seepage loss. 	Ensure availability of varieties from Seed Corporation, Agril Dept.
	Rice-Toria/Linseed	<ul style="list-style-type: none"> ➤ Selection of short duration variety like Lalat, Manaswini, Naveen , MTU1010, Konark ,and Surendra ➤ Bund planting with Arhar, Cowpea, Green garm, Blackgram etc. ➤ Growing Linseed, Toria after paddy. ➤ Linseed Variety: Arpita, Kiran Toria Variety: Anuradha, Parvati. ➤ Adopt agroforestry with bund plantation with Gmelina arborea, Leucaenal eucocephla, L. diversifolia, Glarycidia sp, Anonas qumosa etc ➤ Grow grasses like Stylo santhes, 	-do-	

			Dinanath grass etc. in the field bunds for fodder purpose		
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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
<p>Delayed by 4 weeks</p> <p>July 2nd week</p>	<p>Medium elevation medium rainfall Lateritic soil Upland</p>	Rice- Fallow	<ul style="list-style-type: none"> ➤ Select extra early upland Rice variety like Heera, Sneha ➤ Crop diversification of non-Paddy crops like Pulses (Arhar, Greengram, Blackgram), Oil seeds (Niger, Groundnut), vegetables (Okra, Brinjal, Tomato, Cow pea, Cucurbits), Tuber crops (Sweet potato, Yam) etc. ➤ Short duration varieties of Maize can be grown. ➤ Arhar: PRG-176, UPAS-120 ➤ Greengram: IPM 2-14, Dhauli, Durga ➤ Blackgram: IPU 2-43, Sarala, Prasad, Ujala ➤ Niger: Utkal niger-1 ➤ Groundnut: TMV-2, Devi, Smruti ➤ Yam: (Orissa Elite, Pusa Hemlata) ➤ Sweet potato: Gouri /Kishan ➤ Tomato : Blue star, Utkal Kumari, Utkal Raja Brinjal: Green star, Utkal Anushree, Utkal Tarini ➤ Cowpea: Utkal Manika Okra :Utkal Gourav 	<ul style="list-style-type: none"> ➤ Building soil organic matter by application of FYM ➤ In situ soil water conservation measure like summer ploughing, ploughing across the slope, contour farming, ridge and furrow method of planting, mulching. ➤ Seed treatment of pulses with CaCl₂ solution 0.2% for 20 hours for improving drought resistance in plants 	
		Rice- Blackgram /Horse gram	<ul style="list-style-type: none"> ➤ Select extra early upland Rice variety like Heera, Sneha ➤ Growing pulses like Blackgram, Greengram or vegetables like off-season Radish 	<ul style="list-style-type: none"> ➤ Building soil organic matter by application of FYM ➤ In situ soil water conservation measure like summer ploughing, ploughing across the slope, 	

			<ul style="list-style-type: none"> ➤ Greengram: IPM 2-14, Dhauli, Kamdev, Durga ➤ Blackgram: IPU 2-43, Sarala, Prasad, Ujala ➤ Horsegram: Urmi ➤ Radish : Pusa chetki, Delhi white 	<ul style="list-style-type: none"> contour farming, ridge and furrow method of planting, mulching, ➤ Seed treatment with CaCl₂ solution 0.2% for 20 hours for improving drought resistance in plants in pulse crops 	
		Maize-Toria	<ul style="list-style-type: none"> ➤ Grow short duration Maize varieties like Navjot, Kiran, VL16, DHM-109. ➤ Adopt maize based intercropping system like Maize + Cowpea (2:2), Maize + Runner bean (2:2) ➤ Cowpea: SEB-2, Utkal Manik ➤ Runnerbean : Suphala ➤ Improved Toria variety like M-27 	<ul style="list-style-type: none"> ➤ Summer ploughing across the slope, biofertilizer inoculation. ➤ Building soil organic matter by application of FYM ➤ Seed treatment with CaCl₂ solution 0.2% for 20 hours for improving drought resistance in plants 	
	Medium				
	Land /Lowland	Rice-Chick Pea / Fieldpea	<ul style="list-style-type: none"> ➤ Go for transplanting of 95-100 days duration variety like Khandagiri, Parihata, Jogesh, Bandan ➤ Growing Field pea (Rachana), Lentil and Chick pea (JG 11/JAKI-9218) after paddy as paira crop or relay crop. ➤ Bund planting with Arhar, Cowpea, Greengarm, Blackgram etc. ➤ Adopt agroforestry with bund plantation with Gmelina arborea, Leucaenal eucocephla, L. diversifolia, Glarycidia sp, Anonas qumosa etc ➤ Grow grasses like Stylo santhes, Dinanth grass etc.in the field bunds for fodder purpose. 	<ul style="list-style-type: none"> ➤ Raising community nursery in the vicinity of water sources like village tanks and delay transplanting. ➤ Sowing of paddy nursery at 15 days interval. More area may be put under nursery ➤ Apply life saving irrigation to maintain nursery seedlings. ➤ Application of vermicompost / bio-fertilizer in the nursery for early seedling growth and sowing of pre- germinated seed. ➤ Go transplanted paddy and avoid beushaning Rice ➤ Repair and strengthen field bunds. ➤ Heightening of field bunds to 	

		Rice-Toria /Linseed	<ul style="list-style-type: none"> ➤ Selection of short duration variety like Lalat, Manaswini, Naveen, MTU1010, Konark and Surendra ➤ Bund planting with Arhar, Cowpea, Greengarm, Blackgram etc. ➤ Growing Linseed, Toria after paddy. Linseed variety: Arpita, Kiran ➤ Toria variety : Anuradha, Parvati ➤ Adopt agroforestry with bund plantation with Gmelina arborea, Leucaenal eucocephla, L. diversifolia, Glarycidia sp, Anonas qumosa etc. ➤ Grow grasses like Stylo santhes, Dinanath grass etc.in the field bunds for fodder purpose. 	<p>conserve rainwater</p> <ul style="list-style-type: none"> ➤ Raising community nursery in the vicinity of water sources like village tanks ➤ Sowing of paddy nursery at 15 days interval. More area may be put under nursery ➤ Apply life saving irrigation to maintain nursery seedlings <p>É Application of fertilizer and vermicompost/bio-fertilizer in the nursery for early seedling growth and sowing of pre-germinated seed.</p> <p>É Application of FYM to increase the WHC of soil.</p> <p>É Repair field bunds to protect seepage loss.</p>	Ensure availability of varieties from Seed Corporation, Agril Dept, OUAT, CRR I
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Condition			Suggested Contingency Measures		
Early season drought (delayed onset)	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 6 weeks (July 4 th Week)*	Medium elevation medium rainfall Lateritic soil Upland	Rice-fallow	<ul style="list-style-type: none"> ➤ Raising low water requiring non-paddy crops like Ragi (Arjun), Niger (Utkal Niger), Pulses (Greengram, Blackgram) ➤ Cowpea (SEBII, Swarna) 	<ul style="list-style-type: none"> ➤ Timely interculture and weeding, balanced nutrition for healthy crop growth. ➤ Post emergence spray of Quizalofop5%EC@0.05kg ai/ha in 500 lt of water to control weeds in 	

			<ul style="list-style-type: none"> ➤ Oilseed Groundnut (Devi, Smruti, TMV-2) ➤ Vegetables: Off season Radish (Pusa Chetki, Delhi white) ➤ Kharif Tomato (Utkal Kumari, Hybrids), ➤ Coriander (Karishma) ➤ Brinjal (Greenstar) 	<p>Groundnut.</p> <ul style="list-style-type: none"> ➤ Spraying of 2% KCl+ 0.1 ppm Boron to Blackgram to increase drought tolerance ➤ Foliar application of 2% urea at pre-flowering and flowering stage of Greengram. ➤ Spray 1% urea in vegetable crops ➤ Remove the pest and disease infected plants from the main field. 	
		Rice- Blackgram/ Greengram/ Horsegram	<ul style="list-style-type: none"> ➤ Rice varieties Lalat, Konark, Ranidhan, Surendra ➤ Grow pulses like Blackgram, Greengram ➤ Greengram: IPM-2-14, Sujata, Durga, PDM-11&54 ➤ Blackgram: IPU 2-43, Pant U-19 &30, Ujala, Sarala, Prasad pre-germinated seed 	<ul style="list-style-type: none"> ➤ Optimum plant population, seed inoculation bio-fertilizer, balanced fertilizer application, application of FYM to increase WHC. ➤ Post emergence spray of Quizalofop 5% EC @ 0.05 kg ai/ha in 500 lt of water to control weeds in Groundnut. ➤ Spraying of 2% KCl + 0.1 ppm Boron to Blackgram to increase drought tolerance ➤ Foliar application of 2% urea at pre-flowering and flowering stage of Greengram. ➤ Spray 1% urea in vegetable crops ➤ Remove the pest and disease infected plants from the main field protection measures should be taken to avoid any germination failure because sowing has already got delayed because of late the onset of monsoon. ➤ For Pest affected crop practice need based plant protection measures. ➤ Control rice stem borer and leaf folder attack. ➤ The recommended dose of nitrogen 	Ensure availability of varieties from Seed Corporation, Agril Dept, OUAT, CRRl

				<p>application should be reduced by 40 % in rain fed situation and should be applied as basal and full recommended of P and k should be placed as basal.</p> <p>➤ The field should be free of weeds for utilization of water and nutrients by the late sown crops. Furrow sowing of plant to plant distance with wider inter-row spacing. Use of bulky organic manures is recommended.</p> <p>➤ Mechanical weeding using cono-weeder and in situ incorporation.</p>	
		Maize-Toria	<p>➤ Grow short duration pulses like Blackgram, Greengram</p> <p>➤ Greengram: IPM 2-14, Sujata, Durga, PDM-11&54</p> <p>➤ Blackgram: IPU 2-43, Pant U-19 &30, Ujala, Sarala, Prasad</p> <p>➤ Short duration off season vegetables like Radish (Pusa chetki, Delhi White), coriander (Karishma)</p> <p>Followed by Toria variety: M-27</p>	<p>➤ Line sowing, application of FYM, biofertilizer inoculation</p>	
	Medium land/ Lowland	Rice-Pulse(Chick Pea/FieldPea/Lentil)	<p>➤ Go for transplanting of 95-100 days duration variety like Khandagiri, Bandana</p> <p>➤ Bund planting with Arhar, Cowpea, Greengarm, Blackgram etc Followed by paira cropping with chickpea: Ujjawal, JG-11, JAKI-9218</p> <p>➤ Fieldpea : Rachna,</p> <p>➤ Lentil: B-77, Pua-8</p>	<p>➤ Raising community nursery in the vicinity of water sources like village tanks</p> <p>➤ Application of fertilizer and vermicompost /bio-fertilizer in The nursery for early seedling growth and sowing of pre- germinated seed.</p> <p>➤ Go for transplanted paddy and avoid beushaning Rice</p> <p>➤ On the onset of monsoon adopt closer spacing in Rice and bunch planting</p>	

		Rice-Oilseed (Linseed/Toria)	<ul style="list-style-type: none"> ➤ Go for transplanting of 95-100 days duration variety like Khandagiri, Bandana ➤ Bund planting with Arhar, Cowpea, Greengarm, Blackgram etc Followed by sowing of Toria (Anuradha ,Parvati), linseed (Arpita, kiran) 	-do-	
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Condition		Suggested Contingency Measures			
Early season drought (delayed onset)	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 8 weeks (August 2 nd Week)	Medium elevation Medium rainfall Lateritic Soil Upland	Rice - fallow	<ul style="list-style-type: none"> ➤ Raising low water requiring non- paddy crops like ragi (Arjun, Divyasingh), niger (UtkalNiger) ➤ Pulses (Greengram, Blackgram, Cowpea (SEB II, Swarna), Oilseed-Groundnut (Devi, Smruti, TMV-2 ➤ Vegetables: Off season radish (Pusa Chetki, Delhi white) Kharif Tomato (Laxmi, Utkal Kumari), Coriander (Karishma) Brinjal (Greenstar) 	<ul style="list-style-type: none"> ➤ Timely intercultural operation and weeding, balanced nutrition for healthy crop growth ➤ Bio-fertiliser inoculation Application of FYM to increase WHC. ➤ Spraying of 2% KCl + 0.1ppm Boron to Blackgram. ➤ Foliar application of 2% urea at pre-flowering and flowering stage of Greengram ➤ Spray 1% urea in vegetable crops ➤ Remove the pest and disease infected plants from the main field 	

		Rice-Pulses (Blackgram/Chick pea)	<ul style="list-style-type: none"> ➤ Grow pulses like Blackgram (IPU 2-43, Pant U-19 &30 ,Ujala, Sarala, Prasad) Greengram (IPU 2-14, Sujata, Durga, PDM-11&54) 	<ul style="list-style-type: none"> ➤ Optimum plant population, bio-fertilizer inoculation, balanced fertilizer application. ➤ Spraying of 2% KCl+ 0.1 ppm Boron to Blackgram. ➤ Foliar application of 2% urea at pre-flowering and flowering stage of Greengram. ➤ Spray 1% urea in vegetable crops ➤ Remove the pest and disease infected plants from the main field 	Ensure availability of varieties from Seed Corporation, Agril Dept, OUAT, CRRl
		Maize-Toria	<ul style="list-style-type: none"> ➤ Grow short duration pulses likeBlackgram (IPU 2-43, Pant U-19 &30, Ujala, Sarala, Prasad), Greengram (IPM 2-14, Sujata, Durga, PDM 11&54) ➤ Short duration off seson vegetables like Radish (Pusa chetki, Delhi White), Coriander (Karishma) Followed by Toria, variety : M-27 	<ul style="list-style-type: none"> ➤ Line sowing, ➤ Application of FYM ➤ Biofertilizer inoculation 	
	Mediumland/Lowland	Rice-Pulse(Chick pea/FieldPea/Lentil)	<ul style="list-style-type: none"> ➤Go for transplanting of 95-100 days duration variety like Khandagiri, Bandana ➤Bund planting with Arhar, Cowpea, Greengarm, 	<ul style="list-style-type: none"> ➤ Raising community nursery in the vicinity of water sources like village tanks ➤ Application of fertilizer and vermicompost /bio-fertilizer in 	Ensure availability of varieties from Seed Corporation, Agril Dept, OUAT, CRRl

			Blackgram etc Followed by paira cropping with chickpea:JG-11, Ujjawal, JAKI-9218 Fieldpea:Rachna, Lentil:B-77, Pua-8	the nursery for early seedling growth and sowing of pre-germinated seed. ➤ Go for transplanted paddy and avoid beushaning Rice ➤ On the onset of monsoon adopt closer spacing in Rice and bunch planting.	
		Rice-Oilseed (Linseed/Toria)	➤ Go for transplanting of 95-100 days duration variety like Khandagiri, Bandana ➤ Bund planting with Arhar, Cowpea, Greengarm, Blackgram etc Followed by sowing of Toria(Anuradha, Parvati), linseed (Arpita, Kiran)	-do-	Ensure availability of varieties from Seed Corporation, Agril Dept, OUAT, CRRI

*Matrix for specifying condition of early season drought due to delayed onset of monsoon (2,4,6&8 weeks) compared to normal onset (2.1.1)

Normal onset (Month and week)	Month and week for specifying condition of early season drought due to delayed onset of monsoon			
	Delayed in onset of monsoon by			
	2 wks	4 wks	6 wks	8 wks
June 1 st wk	June 3 rd wk	July 1 st wk	July 3 rd wk	August 1 st week
June 2 nd wk	June 4 th wk	July 2 nd wk	July 4 th wk	August 2 nd week
June 3 rd wk	July 1 st wk	July 3 rd wk	August 1 st week	August 3 rd week
June 4 th wk	July 2 nd wk	July 4 th wk	August 2 nd week	August 4 th week
July 1 st wk	July 3 rd wk	August 1 st week	August 3 rd week	Sept. 1 st week
July 2 nd wk	July 4 th wk	August 2 nd week	August 4 th week	Sept. 2 nd week

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency Measures		
			Crop Management	Soil Management	Remarks on Implementation
❖ Early season drought (Normal onset follows by	Medium elevation	Rice- fallow	➤ When there is more than 50% mortality, re-sowing of the	➤ Organic mulching through Organic residues	

15-20 days dry spell after sowing leading to poor germination/crop stand etc.	and Medium rainfall Lateritic soil Upland		<p>crop with shorter duration varieties</p> <ul style="list-style-type: none"> ➤ If the mortality is less than 50% gap filling may be done ➤ Resowing with Short duration varieties like Heera, Sneha, Pathara ➤ Application of herbicide to control the weed population ➤ Manual weeding for moisture conservation. 	➤ Application of FYM to increase WHC	
		Rice-Pulses (Blackgram/ Horse gram)	-do-	-do-	
		Maize-Toria	<ul style="list-style-type: none"> ➤ Sow some cowpea / Greengram / Blackgram in the row spaces after onset of rainfall ➤ Take extra sowing in 10% of land or in leaf pots. Gap filling with the plants of equal duration ➤ Seed soaking with CaCl₂ 0.25 % solution for 20 hours before sowing for drought hardening ➤ Early variety like Navjot 	<ul style="list-style-type: none"> ➤ Weed control measure ➤ Organic mulching through organic residues 	
	Medium land/ Low land	Rice-Pulse (Chickpea/Fieldpea/Lentil)	<ul style="list-style-type: none"> ➤ If plant population is less than 50%, re-sowing of the crop with shorter duration variety like recommended like Lalat, Manaswini, Naveen, MTU1010, Konark, SahabagiDhan and Surendra ➤ Sprouted seeds of shorter duration variety may be directly sown or raised for 	<ul style="list-style-type: none"> ➤ Develop series of farm ponds for harvesting the rain water ➤ Strengthen the field bunds and plugging of drainage holes. 	

			seedling. ➤ If plant population is more than 50% carry out weeding and adjust the plant population by Khelua and clonal propagation (double transplanting) ➤ Raising of community nursery in the vicinity of water source ➤ Use higher seed rate		
		Rice-Oilseed (Torja/Linseed)	-do-	➤ Develop series of farm ponds for harvesting the rainwater ➤ Strengthen the field bunds and plugging of drainage holes.	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency Measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)			Crop Management	Soil Management	Remarks on Implementation
At vegetative stage	Medium elevation and Medium rainfall Lateritic soil Upland	Rice-fallow	➤ Thinning of excess plants, weeding, mulching and maintain optimum plant population Lime and FYM application ➤ Apply Monocortophus @ 2 ml/liter of water to control mealy bug and thrips ➤ Water stress during August and September may lead to severe incidence of blast and brown spot. Application of tricyclazole @ 0.6 ml/liter of water or Kasuagamycin @ 2ml/liter of water at 15 days interval will reduce the incidence of blast.	➤ Life saving irrigation	
		Rice-Pulses (Blackgram) Horsegram/	➤ Maintain optimum plant population, Lime and FYM application ➤ Apply Monocortophus @ 2ml/liter of	➤ Life saving irrigation Weeding, Mulching	

			<p>water to control mealybug and thrips</p> <ul style="list-style-type: none"> ➤ Application of tricyclazole@ 0.6 ml/liter of water or Kasugamycin@ 2 ml/liter of water at 15days interval will reduce the incidence of blast. 		
		Maize-Toria	<ul style="list-style-type: none"> ➤ Complete hoeing and weeding to provide dust mulch ➤ Lime and FYM application ➤ Ridge and furrow method of Planting ➤ Soil application of chloropyriphus @ 2 ml/liter of water to prevent termite attack ➤ Foliar application of mancozeb@3 g/liter of water against Tersicum leaf blight 	<ul style="list-style-type: none"> ➤ Life saving irrigation ➤ Compartmental bunding 	
	Medium land /Lowland	Rice-Pulse (Chickpea /FieldPea /Lentil)	<ul style="list-style-type: none"> ➤ Avoid beushaning (blind cultivation) in Rice, if the crop is more than 45 days old. ➤ Weed out the field without waiting for rainfall. ➤ Go for gap filling using seedling of same age or clonal tillers to have a uniform distribution of plant. ➤ Withhold N fertilizer application up to receipt of rainfall. ➤ Foliar spray of 2% urea solution ➤ Apply Monocortophus @ 2ml/liter of water to control mealy bug and thrips ➤ Application of tricyclazole@ 0.6 ml/liter of water or Kasugamycin@2 ml/liter of water at 15 days interval will reduce the incidence of blast. 	<ul style="list-style-type: none"> ➤ On-farm water harvesting Structures & Life saving irrigation. ➤ Strengthen the field bunds and close the holes to check seepage loss. 	
		Rice-Oilseed (Toria/Linseed)	Same as above	<ul style="list-style-type: none"> ➤ On-farm water harvesting structures & Life saving irrigation 	

At flowering/ Fruiting stage	Medium elevation Medium rainfall Lateritic soil Upland	Rice-fallow	<ul style="list-style-type: none"> ➤ Provide protective irrigation through recycling of harvested drain water. Provide irrigation at critical stages such as flowering, grain filling etc. ➤ Incidence of Rice mealybug may occur. Apply methyl demeton @ 500ml/ha or Imidaclopid @ 100ml/ha ➤ Grass hopper incidence may also occur. Dusting of chlorpyrifos @ 25kg/ha in the field bunds recommended. ➤ Termite incidence may occur apply chlorpyrifos @ 1lit/ha ➤ Application of tricyclazole @ 0.6 ml / liter of water or Kasuagamycin @ 2 ml / liter of water at 15 days interval will reduce the incidence of blast. 	<ul style="list-style-type: none"> ➤ Judicious use of water from farm pond ➤ Life saving irrigation ➤ Strengthening of field bunds 	
		Rice-pulse (Blackgram /Chickpea)	-do-	<ul style="list-style-type: none"> ➤ Judicious use of water from farm pond ➤ Life saving irrigation ➤ Strengthening of field bunds. 	
		Maize-Toria	<ul style="list-style-type: none"> ➤ Termite incidence may occur apply chlorpyrifos @ 2ml / liter of water ➤ If drought occurs at early maturing stage, harvest the green cobs and sell in the market. ➤ Foliar application of mancozeb @ 3 g/liter of water against Tarsicum leaf blight. 	<ul style="list-style-type: none"> ➤ Provide protective irrigation through recycling of harvest drain water. ➤ Provide irrigation at critical stages such as flowering, grain filling etc. in alternate furrows in wide spaced crops. ➤ Organic mulching Manual weeding or apply herbicide 	
	Medium land /Low land	Rice-Pulse (Chick pea/Field Pea /Lentil)	<ul style="list-style-type: none"> ➤ Provide protective irrigation through recycling of harvest drain water. ➤ Withhold N fertilizer application upto receipt of rainfall. ➤ Apply Potassic fertilizers wherever soil moisture allows or wait up to receipt of rainfall. ➤ Strengthen the field bunds and close the 	<ul style="list-style-type: none"> ➤ Judicious use of water from farm pond ➤ Life saving Irrigation 	

			drainage holes to check seepage loss		
		Rice-oilseed (Toria/Linseed)	-do-	-do-	
Terminal drought	Medium elevation Medium rainfall Lateritic soil Upland	Rice- fallow	<ul style="list-style-type: none"> ➤ Provide protective irrigation through recycling of harvest drain water. Provide irrigation at critical stages such as flowering, grain filling etc. ➤ Application of tricyclazole@ 0.6 ml/liter of water or casuagamycin@2 ml/liter of water at 10 days interval to prevent outbreak of foliar, node and neck blast. ➤ Harvesting at physiological maturity stage. 	-	
		Rice-Pulse (Blackgram/Horse gram)	<ul style="list-style-type: none"> ➤ Provide protective irrigation through recycling of harvest drain water. Provide irrigation at critical stages such as flowering, grain filling etc. ➤ Application of tricyclazole@ 0.6 ml /liter of water or casuagamycin @ 2 ml/liter of water at 10 days interval to prevent outbreak of foliar, node and neck blast. 	-	
		Upland Maize-Toria	<ul style="list-style-type: none"> ➤ Provide protective irrigation through recycling of harvested rain water. Provide irrigation at critical stages such as flowering, grain filling etc. ➤ Harvest maize for green cob purpose. 	-	
	Medium land /Low land	Rice-Pulse (Chick pea/Field pea/Lentil)	<ul style="list-style-type: none"> ➤ Provide protective irrigation ➤ Arrange of crop insurance in case of crop failure ➤ Strengthen the field bunds 	<ul style="list-style-type: none"> ➤ Sow seeds for paira cropping of blackgram, lentil, chickpea, lathyrus, before 15 days of rice crop harvesting. 	

		Rice-Oilseed (Torja/Linseed)	<ul style="list-style-type: none"> ➤ Provide protective irrigation ➤ Arrange of crop insurance in case of crop failure ➤ Strengthen the field bunds 	-	
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2.1.2 Irrigated situation

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency Measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Medium elevation Irrigated Lateritic soil Medium land/Low land	Rice-Pulse (Chickpea/field pea/Lentil)	<ul style="list-style-type: none"> ➤ Prefer Varieties like Khandagiri, SahabhagiDhan ➤ Utilization of water from other sources like pond water, harvested rainwater 	<ul style="list-style-type: none"> ➤ Raise community nursery of Rice for transplanting to save time. ➤ Apply FYM to increase the WHC of soil. ➤ Reduction of conveyance losses during irrigation ➤ Weed management ➤ Irrigation at critical growth stages. 	Desalting, repairing, renovation and construction of new conveyance system under different schemes like NREGA, BRGF, MPLAD funds, etc.
		Rice-Oil seed (Torja/Linseed)	<ul style="list-style-type: none"> ➤ Prefer varieties like Khandagiri, SahabhagiDhan ➤ Utilisation of water from other sources like pond water, harvested rainwater ➤ Weed management ➤ Irrigation at critical growth stages 	<ul style="list-style-type: none"> ➤ Raise community nursery of rice for transplanting to save time. ➤ Apply FYM to increase the WHC of soil ➤ Reduction of conveyance losses during irrigation 	
Limited release of water in canals due to low rainfall	Medium elevation irrigated Lateritic soil/ Medium land /Lowland	Rice-Pulse (Chickpea/field pea/Lentil)	<ul style="list-style-type: none"> ➤ Varieties like Khandagiri, Sahabahgidhan, ➤ Utilization of water from other sources like pond water, harvested rainwater ➤ Motivate the tail end farmers to grow low duty crops like pulses, 	-do-	

			oilseeds		
		Rice-Oil Seed (Toria/Linseed)	-do-	<ul style="list-style-type: none"> ➤ Raising community nursery ➤ Apply FYM to increase the WHC of soil. ➤ Reduction of conveyance losses during irrigation 	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency Measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchments	Medium elevation Irrigated Lateritic soil Medium land /Low land	Rice-Pulse (Chickpea/field Pea /Lentil)	<ul style="list-style-type: none"> ➤ Varieties like Khandagiri, Sahabhadhan ➤ Utilisation of water from other sources like pond water, harvested rainwater ➤ Motivate farmers to grow low duty crops like pulses and oilseeds 	-do-	
		Rice-Oilseed (Toria/Linseed)	<ul style="list-style-type: none"> ➤ Varieties like Khandagiri, Sahabhadhan ➤ Utilisation of water from other sources like pond water, harvested rainwater ➤ Motivate farmers to grow low duty crops like pulses and oilseeds 	-do-	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency Measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient/ delayed onset of monsoon	Medium elevation Irrigated Lateritic soil Medium land /Low land	Rice-Pulse (Chickpea/field pea /Lentil)	<ul style="list-style-type: none"> ➤ Go for short duration varieties like Khandagiri, Sahabhadhan 	<ul style="list-style-type: none"> ➤ Raising community nursery 	

		Rice-Oilseed (Toriam/Linseed)	-do-	-do-	
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Condition			Suggested Contingency Measures		
Insufficient ground water recharge due to low rainfall	Major Farming situation ^a	Crop/cropping system ^b	Change in crop/cropping system ^c	Agronomic measures ^d	Remarks on Implementation ^e
	Medium elevation irrigated Lateritic soil /Medium land /Lowland	Rice-Pulse (Chickpea/field pea /Lentil)	<ul style="list-style-type: none"> ➤ Sow drought tolerant non paddy crops like Greengram, Blackgram, Cowpea in place of Rice ➤ Harvesting at physiological maturity stage. 	<ul style="list-style-type: none"> ➤ Ground water recharges through development of percolation tank and farm ponds. <ul style="list-style-type: none"> ▪ Mulching to conserve soil 	
		Rice-Oilseed (Toriam/Linseed)	-do-	-do-	

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

Condition	Suggested contingency measures			
Continuous high rainfall in a short span leading to water logging	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Rice	<ul style="list-style-type: none"> ➤ If damage is more than 50% re-transplant Rice crop of medium duration group. ➤ In partially damaged fields, allow the Rice plants to stand up right. ➤ Do not go for beushaning as it may further reduce the plant population. ➤ Carry out Weeding in the Rice field; make gap filling and top dress N and K to boost the growth 	<ul style="list-style-type: none"> ➤ Arrange for drainage ➤ Take care to prevent the spread of disease like Sheath blight and Sheath rot and insect like BPH and Cutworms 	<ul style="list-style-type: none"> ➤ Harvest as soon as the water recedes. 	<ul style="list-style-type: none"> ➤ Protect the seeds from rain, go for sun drying for two to three days

	if situation permits.			
Maize	<ul style="list-style-type: none"> ➤ Provide drainage ➤ Give earthing up and clean weeds 	<ul style="list-style-type: none"> ➤ Arrange for drainage ➤ Care should be taken to check disease like maydis leaf blight, T.L.B 	-do-	-do-
Arhar	<ul style="list-style-type: none"> ➤ Provide drainage through intermittent ➤ Drainage line. 	<ul style="list-style-type: none"> ➤ Arrange for drainage, plant protection measures from disease and pest 	➤ -do-	➤ -do-
Blackgram	<ul style="list-style-type: none"> ➤ Give drainage though drainage line. 	<ul style="list-style-type: none"> ➤ Arrange for drainage ➤ Plantation measures against Jassids and YMV 	-do-	-do-
Greengram	-do-	-do-	-do-	-do-
Horticulture				
Brinjal	<ul style="list-style-type: none"> ➤ Drainage of excess water from the field soil drenching with Carbendazim + streptocycline. ➤ Locally available organic materials like FYM,poultry manure, goat manure, green leaves, organic cakes, fish meal, bone meal, etc. may be given priority for use in the organic farming. Apply farmyard manure or compost as basal dose and organic concentrates like organic cakes, poultry manure, vermin-compost etc. as top dressing. Weeds to be used as mulches or cover it with soil for converting to organic matter 	<ul style="list-style-type: none"> ➤ Apply PCPA /NAA to prevent flower drop Provide drainage, plant protection measures against wilting and fruit rot. ➤ Leguminous crop should be grown and plough back to soil at its pre flowering stage before cultivating a heavy feeding vegetable crop in particular site. 	<ul style="list-style-type: none"> ➤ If Wilting occurs Soil drenching with Carbendazim + Streptocycline ➤ Insects like Trichogramma brasiliensis, T. chilonis and Chrysoperlacarnea can also be utilized in eco-friendly pest control in vegetables. Micro organisms like viruses, fungi, bacteria etc. should be utilized in pest control under organic farming. Home made 	<ul style="list-style-type: none"> ➤ Shifting the produce to safer place to maintain the quality and immediate disposal of produce.

			<p>insecticides like neem oil ó garlic mixture, neem kernel suspension, tobacco decoction, etc. have wide use for control of pests and diseases in organic farming of vegetables. Plants like Andropogon sp., Clerodendron, Eucalyptus etc. also have values in pest control. Remove alternate hosts of pests and diseases and follow eco-friendly pests and disease control measures like cutting and removal of pests and diseased plants or plant parts, trap cropping, use of colour, sticky and other traps for attracting and killing insects. Burning pits before sowing or practice solarisation to control soil borne pests and diseases.</p>	
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Tomato	<ul style="list-style-type: none"> ➤ Drainage of excess water from the field soil drenching with Bavistin + streptocycline 	-do-	-do-	-do-
Cauliflower	<ul style="list-style-type: none"> ➤ In case of Incidence of collar rot- Spraying of Metalaxyl+ Mancozeb, drainage of excesswater. 	<ul style="list-style-type: none"> ➤ If curd rot apply Metalaxyl+Mancozeb ➤ Drainage the excess water 	<ul style="list-style-type: none"> ➤ Immediate harvest and disposal 	-do-
Okra	<ul style="list-style-type: none"> ➤ Drainage of excess water, plant protection measures against YVMV 	<ul style="list-style-type: none"> ➤ Provide drainage and plant protection measures against YVMV 	-do-	-do-
Papaya	<ul style="list-style-type: none"> ➤ Drainage of excess water, Spray Metalaxyl+Mancozeb at the plant base. ➤ Plant protection measures against whitefly vector (Use of yellow sticky traps, chemicals like acetamiprid, acephate, thiomethoxam alternately) 	<ul style="list-style-type: none"> ➤ Drainage of excess water Spray Metalaxyl + Mancozeb at the plant base. ➤ Plant protection measures against whitefly vector (Use of yellow sticky traps, chemicals like acetamiprid, acephate, thiomethoxam alternately) 	-do-	-do-
Heavy rainfall with high speed winds in a short span				
Paddy	<ul style="list-style-type: none"> ➤ If damage is more than 50% re-transplant Rice crop of medium duration group. ➤ In partially damaged fields, allow the Rice plants to standup right. ➤ Do not go for beushaning as it may further reduce the plant population. 	<ul style="list-style-type: none"> ➤ Arrange for drainage 	<ul style="list-style-type: none"> ➤ Harvest as soon as the water recedes 	<ul style="list-style-type: none"> ➤ Protect the seeds from rain, go for sun drying for two to three days

	➤ Carry out weeding in the Rice field, make gap filling and topdress N and K to boost the growth if situation permits.			
Maize	➤ Provide drainage	➤ Provide drainage	➤ Provide drainage	-do-
Arhar	-do-	-do-	-do-	-do-
Blackgram	-do-	-do-	-do-	-do-
Greengram	-do-	-do-	-do-	-do-
Horticulture				
Brinjal	➤ If the plants are very young there may be Uprooting and cracking of mainstem Immediate application of soil at the base to strengthening and gap filling	➤ Apply PCPA/NAA to prevent flower drop	➤ Immediate harvest and disposal	➤ Shifting the produce to safer place to maintain the quality and immediate disposal of produce.
Tomato	-do-	-do-	-do-	-do-
Cauliflower		-do-	-do-	-do-
Okra	-do-	➤ Strengthening the plants by application of soil at the base	-do-	-do-
Papaya	-do-	➤ Strengthening the plants by application of soil at the base	-do-	-do-
Outbreak of pests and diseases due to unseasonal rains				
Rice	<p>➤ Heavy rainfall and flash flood like situation increase the swarming caterpillar incidence. Apply Chloropyriphos /DDVP in the bunds during evening hour.</p> <p>➤ To avoid Case worm and leaf folder incidence apply Carbosulfan</p> <p>➤ Water logging situation may</p>	<p>➤ Sudden heavy rain followed by dry spell may result in severe occurrence of bacterial leaf streak and bacterial blight in Rice. It is advised to spray the crop immediately after each rain storm with streptomycin (0.01%) or plantomycin (0.1%) with</p>	<p>➤ Prolonged dry-spell after normal rainfall will increase the incidence of Grain blast. Spray tricyclazole @3ml /5 liter of water</p>	<p>➤ Store Rice after proper drying to minimize the incidence of stored grain pest</p>

	lead to sheath rot and sheath blight incidence timely application of validamycin and hexaconazole at 15days interval.	copper oxychloride. Apply additional dose of Potash. ➤ High humidity and high temperature may lead to BPH infestation , apply thiomethoxam@150g/ha ➤ Incidence of climbing cutworm may occur, apply DDVP or Chloro pyriphos during evening hours		
Maize	➤ Drain the excess water	➤ Wilting in the water logging areas- Drain the excess water	-	-
Arhar	➤ Wilt and pod borer incidence, apply Copper oxy chloride and Indoxacarb	➤ Wilt and podborer incidence, apply Copper oxy chloride and Indoxacarb	-	➤ In storage condition prevent the incidence of pulse beetle by mixing the seed with some vegetable oil
Blackgram	➤ High humidity increases the leaf hopper and Black aphid incidence. Apply Acephate	➤ High humidity increases the leaf hopper and Black aphid incidence. Apply Acephate	-	-do-
Greengram	-do-	-do-	-	-do-
Horticulture				
Brinjal	➤ Bacterial wilt may appear. Spray Carbandezim with plantomycin.	➤ Fruit rot may occur. Apply metalaxyl+mancozeb@2g/litre	-	
Tomato	-do-	-do-	-	-
Cauliflower	➤ Collar rot incidence may aggravate. Apply metalaxyl+mancozeb@2g/litre	➤ Head rot and curd rot incidence along with bacterial blight may appear.	-	-

		Apply plantomycin along with copper oxychloride @1g/liter of water along with copper oxy chloride @ 3g /litre		
Okra	➤ Apply acetamiprid @ 3g / 10 liter of water to prevent YVMV incidence	-	➤ Apply neem based pesticide or Btto minimize fruit borer incidence.	
Papaya	➤ Rotting at basal portion, provide drainage	-	➤ Harvest the fruit	-

2.3 Floods

Condition	Suggested contingency measures			
	Seedling/ nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Rice	<ul style="list-style-type: none"> ➤ Maintaining nursery of over aged Rice seedlings of 45days to 60 days duration. Nursery treatment with granular pesticide to prevent pest damage. ➤ Raising nursery under DAPOG method ➤ Apply DDVP / Chloro pyriphosin the field and field bunds during evening hours to protect 	<ul style="list-style-type: none"> ➤ If the damage is less than 50% adoption of double transplanting or clonal method of propagation is advocated. Additional dose of fertilizer (N,P,K) is recommended ➤ Avoid beushaning operation ➤ If damage is more than 50% re- transplanting of crops with medium duration group is advocated. ➤ Take precautionary measures against leaf folder and case worm 	<ul style="list-style-type: none"> ➤ Removal of sand from the field in case of sand deposition and planning for alternate crops like sweet potato under zero tillage. ➤ If flood comes during reproductive stage, there is chance to damage Rice, emphasis should be given on forth coming rabi crops. 	<ul style="list-style-type: none"> ➤ Spraying plant growth hormones that prevent premature germination of Rice seeds.

	the crop against swarming caterpillars			
Blackgram/Greengram	➤ Re sows the crop if damage is more than 50%. Prefer short duration variety	➤ Apply acetamiprid to avoid hopper burn and black aphid incidence. Provide drainage ➤ Apply chloro pyriphos + cypermethrin to protect the crop from hairy caterpillars	➤ Apply indoxacarb to prevent pod borer incidence	➤ Harvest quickly to avoid seed shattering
Horticulture				
Tomato	➤ Resowing of crop, grow short duration variety, gap filling in the main field	➤ Application of potash fertilizer@5kg/acre, apply carbendyzim along with plantomycin to reduce wilt incidence. Apply additional dose of fertilizer to induce the vegetative growth	➤ Crop should be harvested before fruit ripening stage in order avoid fruit rotting. Need based application of metalaxyl + mancozeb to reduce further Fruit rotting.	➤ Store in well ventilated elevated places
Okra	➤ Resowing of crop, grow short duration variety, gap filling in the main field	➤ Apply mancozeb to reduce the incidence of Cercospora leaf spot and blight. Provide drainage. Apply additional dose of fertilizer to induce the vegetative growth	-	➤ Harvest the fruit in tender stage and market it immediately
Cucurbits	➤ Resow the crop with seed treatment in case of crop failure	➤ Apply additional dose of fertilizer for early vigour. Spray thiophenatemethyl against downy mildew		
Continuous submergence for more than 2 days				
Rice:	➤ Maintaining nursery of over aged Rice seedlings of 45 days to 60 days duration. Nursery treatment with granular pesticide to prevent pest damage. ➤ Raising nursery under DAPOG Method	➤ If the damage is less than 50% adoption of double transplanting or clonal method of propagation is advocated. Additional dose of fertilizer (N,P,K) is recommended ➤ Avoid beushning operation ➤ If damage is more than 50% re- transplanting of crops with medium duration group is advocated. ➤ Take precautionary measures against leaf	➤ Removal of sand from the field in case of sand deposition and planning for alternate crops like sweet potato under zero tillage. ➤ If flood comes during reproductive stage, there is chance to damage Rice, emphasis should be given on	➤ Spraying plant growth hormones that prevent premature germination of Rice seeds.

		folder and caseworm	forthcoming rabi crops.	
Blackgram/greengram	➤ Resow the crop if damage is more than 50%. Prefer short duration variety	➤ Apply Acetamiprid to avoid hopper burn and blackaphid incidence. Provide drainage ➤ Apply chloropyriphus + cypermethrin to protect the crop from hairy caterpillars	➤ Apply Indoxacarb to prevent pod borer incidence	➤ Harvest quickly to avoid seed shattering
Horticulture				
Tomato	➤ Resowing of crop, grow short duration variety, gap filling in the main field	➤ Application of potash fertilizer@5kg/acre, apply carbendazim along with plantomycin to reduce wilt incidence. Apply additional dose of fertilizer to induce the vegetative growth	➤ Crop should be harvested before fruit ripening stage in order avoid fruit rotting. Need based application of metalaxyl ➤ +mancozebto reducefurther fruitrotting.	➤ Store in well ventilated elevated places
Okra	➤ Resowing of crop, grow short duration variety, gap filling in the main field	➤ Apply mancozeb to reduce the incidence of cercospora leaf spot and blight. Provide drainage. Apply additional dose of fertilizer to induce the vegetative growth	-	➤ Harvest the fruit in tender stage and market it immediately
Cucurbits	➤ Resow the crop with seed treatment in case of crop failure	➤ Apply additional dose of fertilizer for early vigour. Spray thiophenatemethyl against downy mildew		
Sea water inundation	NA			

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

Extreme event type	Suggested contingency measurer			
	Seedling/ nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave				
Paddy	➤ Provide irrigation through sprinkler	➤ Provide irrigation through sprinkler	➤ Provide irrigation through sprinkler	-
Maize	-do-	-do-	-do-	-

Arhar	-do-	-do-	-do-	-
Blackgram	-do-	-do-	-do-	-
Greengram	-do-	-do-	-do-	-
Horticulture				
Tomato	➤ Wilting and mortality due to heat 6immediate irrigation and covering the nursery bed with paddy straw /local leaves	➤ Immediate irrigation followed by Mulching	➤ Drying of flower-spraying of PCOA, Immediate irrigation followed by mulching	➤ Less production of lycopene and yellowing of fruits, sun scalding6 Application of Irrigation and immediate harvest and shifting to safer place
Brinjal	-do-	-do-	-do-	➤ Application of Irrigation and immediate harvest and shifting to safer place
Okra	-do-	-do-	-do-	➤ Application of Irrigation and immediate harvest and shifting to safer place
Cucurbits	-do-	-do-	-do-	➤ Application of Irrigation and immediate harvest and shifting to safer place
Cold wave	NA			
Frost	NA			
Hailstorm	NA			
Cyclone	NA			

2.5 Contingent strategies for Livestock, Poultry & Fisheries**2.5.1 Livestock**

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Feed and fodder availability	➤ Arrangement of Ricebran & paddy straw in advance	➤ Providing sufficient feed to save the live Stocks	-
Drinking water	➤ Construction of borewell, cement at & other infrastructures to store water	➤ Providing sufficient water to the livestock	-
Health and disease management	➤ Preventive measures against contagious diseases	➤ To go for fluid therapy and other treatments	➤ Postevent Vaccination, providing Antibiotics & other life saving drugs
Floods			
Feed and fodder availability	➤ Storing enough feed and fodder	➤ Supply of feed during flood	-
Drinking water	➤ Provision for storing drinking water	➤ Supply of drinking water	➤ Disinfection of water and sources
Health and disease management	➤ Procurement and storing of medicines, Preflood vaccination and inoculation	➤ Keep livestock in the shelter, Health camp during flood	➤ Healthcamp, Vaccination after flood, proper disposal of carcass
Cyclone			
Feed and fodder availability	NA	NA	NA
Drinkingwater	NA	NA	NA
Healthanddisease management	NA	NA	NA
Heat wave and cold wave			
Shelter/environment management	➤ Creation of awareness to avoid heat stress	➤ Keep animal inside shelter, providing, water in time, bathing	-
Health and disease management	➤ To stock essential medicines and water	➤ Treatments	➤ Postevent health camp

2.5.2 Poultry

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Feed and fodder availability	➤ Storing sufficient feed	➤ Feed with supplementary Feed	-
Drinking water	➤ Infrastructure development to store and supply	➤ Supply sufficient drinking Water	-
Health and diseases management	➤ Preventive measures against contagious diseases	➤ To go for fluid therapy and Other treatments	➤ Post event Vaccination, providing antibiotics & other life saving drugs
Floods			
Feed and fodder availability	➤ Storing enough feed	➤ Supply of feed during Flood	-
Drinking water	➤ Provision for storing drinking water	➤ Supply of drinking water	➤ Disinfection of water and sources
Health and diseases management	➤ Procurement and storing of medicines, Preflood vaccination and inoculation	➤ Keep in the shelter, Treatment	➤ Health camp, Vaccination after flood, proper disposal of carcass
Cyclone			
Feed and fodder availability	NA	NA	NA
Drinking water	NA	NA	NA
Health and diseases management	NA	NA	NA
Heat wave			
Shelter/ environment management	➤ Creation of awareness to avoid heat stress	➤ Keep animal inside shelter/protected cover, providing cold water in time, Spraying water	
Health and diseases management	➤ To stock essential medicines,	➤ Treatments	➤ Post event health camp

	vaccines and water		
Cold wave			
Shelter/ environment management	<ul style="list-style-type: none"> ➤ Procurement of curtains to cover open sides of the shed. ➤ Heating arrangement kept ready 	<ul style="list-style-type: none"> ➤ Close the open sides of the shed by curtain in such a way that ventilation should not be hampered. ➤ Provide heat if necessary depending on the temperature and age of the birds 	<ul style="list-style-type: none"> ➤ Remove the curtains. ➤ Discontinue heating.
Health and diseases management	<ul style="list-style-type: none"> ➤ Procurement of Anti stress drugs and vaccine 	<ul style="list-style-type: none"> ➤ Feeding of anti stress drugs in drinking water Vaccination with fowl pox 	<ul style="list-style-type: none"> ➤ Vaccination against IBD and RD

based on forewarning wherever available

2.5.3 Fisheries

Suggested contingency measures			
	Before the event	During the event	After the event
Drought			
Shallow water in ponds due to insufficient rains/inflows.	Harvest of IMCs in case of polyculture with minor carps or Magur	Maintain the minor carp/magur culture	Raise the water level, if possible and restock the pond with stunted IMC yearlings
Impact of heat and salt load build up on ponds. change in water quality	Harvest IMCs in case of polyculture with fresh water prawns	Maintain the fresh water prawn culture	Raise the water level, if possible and restock the pond with stunted IMC yearlings
Floods			
Inundation with flood waters	Harvest out marketable fishes. Encircle stake nets (1.5m high) Put perforated feed bags inside the pond	Keep a vigil on the embankment & install stake nets.	By continuous netting , eradicate trash fishes, if any. Restock the fish pond, if required
Water contamination and changes in BOD			
Health and diseases management			Disinfect the pond with lime

Cyclone			
Overflow /flooding of ponds	As in case of floods	As in case of floods	As in case of floods
Changes in fresh/brackish water ratio			
Health and diseases management			
Heat wave and cold wave			
Management of pond environment management	For heat wave, raise the average water depth of the pond upto 6ft. level.	Exchange the pond water 5 to 10% daily with cool bore-well water.	Maintain the water level upto 5ft.
Health and diseases management			

Sd/-
Senior Scientist and Head
KVK, Keonjhar