State: KERALA

Agriculture Contingency Plan for District: PALAKKAD

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Sub Region (ICAR)	Western Ghats And Coastal Plain, Hot Humid region (19.2)			
	Agro-Climatic Region (Planning Commission)	West Coast Plains And Ghat Region (XII)			
	Agro Climatic Zone (NARP)	Central zone (KE-3)			
	List all the districts or part thereof falling under the NARP Zone	Palakkad, Malappuram, Thrissur, Ernakulam, Wayanad			
	Geographic coordinates of district	Latitude	Longitude	Altitude	
		10° 46' 8.00" N	76° 38' 51.74" E	94 m above MSL	
	Name and address of the concerned ZRS/ ZARS/ **RARS**/ RRS/ RRTTS	**Regional Agricultural Research Station Pattambi**, Mele **Pattambi** P.O., Palakkad-679 306.			
	Mention the KVK located in the district	**Krishi Vigyan Kendra**, Pattambi, **Palakkad** Dist., Pin - 679 306,			
1.2	**Rainfall**	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	800-1400	86.00	June 1st week	September last week
	NE Monsoon(Oct-Dec):	600-800	25.00	October 1st week	November 1st week
	Winter (Jan- March)	50-100	4.00	-	-
	Summer (Apr-May)	80-120	19.00	-	-
	Annual	2472.1	135.00	-	-
	Actual (July 2008-2009 June)	1666.60			

1.3	**Land use pattern of the district** (latest statistics)	Geographical area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
Area (Lakh ha)		4.47	1.36	0.45	-	0.29	0.017	0.032	0.10	0.09

Source, IMD, RARS, Pattambi, Farm Guide 2011

1. 4	**Major Soils (common names like shallow red soils etc.,)**	**Area ('000 ha)**	**Percent (%) of total**
	Red soils	270.2	65.8
	Loamy soils	154.1	30.7
	Clayey soil	9.5	2.92
	Loamy sand	0.5	0.58
1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	197.2	159%
	Area sown more than once	117.4	
	Gross cropped area	314.6	

Source : SREP, Palakkad, Farm Guide 2011

1.6	**Irrigation**	Area ('000 ha)		
	Net irrigated area	93.0		
	Gross irrigated area	108.5		
	Rainfed area (Net sown area – Net irrigated area)	104.1		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		48.4	45.0
	Tanks		5.3	8.4
	Open wells	137	18.6	17.3
	Bore wells	43	6.6	6.1
	Lift irrigation	170	-	-
	Minor-irrigation		0.7	0.7
	Other sources	1294	13.2	12.3
	Total Irrigated Area		93.0	
	Pump sets	20900		

	No. of Tractors		
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area
	Over exploited		
	Critical		
	Semi- critical		
	Safe	44-Safe	
	Wastewater availability and use		
	Ground water quality		
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%			

Source: Irrigation Department, Palakkad

1.7 Area under major field crops & horticulture etc. (2008-09)

1.7	**Major Field Crops cultivated**	**Area ('000 ha)**						
		Kharif		***Rabi***		**Summer**		**Total**
		Irrigated	***Rainfed***	***Irrigated***	***Rainfed***	***Irrigated***	***Rainfed***	
	Rice	*9.3*	*36.2*	38.8	*3.5*	8.1	0.002	96.1
	Total	*45.6*		*42.3*		8.1		96.1
	Jowar							2.2
	Ragi							0.5
	Other cereals							0.3
	Total area under cereals/millets							99.4
	Pulses	*0.1*		1.6		0.8		1.9

	Horticulture crops - Fruits	**Total area('000 ha)**
	Banana	11.517
	Mango	8.479
	Plantain	10.819
	Jack	5.860
	Papaya	1.412
	Pineapple	0.102

	Other fresh fruits	1.184
	Horticultural crops – Vegetables	**Total area('000 ha)**
	Drumstick	2.102
	Bitter gourd	0.598
	Ladies finger	0.427
	Green chillies	0.410
	Amaranthus	0.159
	Snake gourd	0.340
	Brinjal	0.231
	Ash gourd	0.205
	Little gourd	0.092
	Pumpkin	0.279
	Cucumber	0.147
	Other vegetables	2.757
	Medicinal and Aromatic crops	**Total area('000 ha)**
	Medicinal and Aromatic crops	0.598
	Sugar crops	
	Sugar cane	0.772
	Palmyra palm	2.292
	Spices & condiments	
	Pepper	5.661
	Ginger	1.044
	Turmeric	0.528
	Cardamom	2.754
	Arecanut	8.195
	Tamarind	4.449
	Vanilla	0.203
	Clove	0.008
	Nutmeg	0. 203
	Cinnamon	0.019
	Other spices & condiments	
	Plantation crops	**Total area('000 ha)**
	Rubber	34.8
	Tea	0.8
	Coffee	4.6

	Cocoa	0.1
	Cashew	3.7
	Fodder crops	**Total area**
	Fodder grass	1.1
	Green manure crops	3.2
	Grazing land	-
	Sericulture etc	-
	Others (Specify)	
	Other trees & crops	22.8
	Tuber crops	
	Tapioca	3.2
	Amorphophallus	0.5
	Colocasia	0.6
	Yam	0.0
	Sweet potato	0.0
	Other tuber crops	0.8
	Oil seeds	
	Groundnut	1.7
	Coconut	59.0
	Sesame	0.03
	Others	0.6
	Other non food crops (Cotton, betel leaves, lemon grass)	1.1

Source: Farm Guide, 2011

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	29.2	116.4	145.7
	Crossbred cattle	30.5	187.0	217.6
	Non descriptive Buffaloes (local low yielding)	-		35.6
	Graded Buffaloes	-		
	Goat			162.4
	Sheep			0.4
	Others (Camel, Pig, Yak etc.)			142.3
	Commercial dairy farms (Number)			-
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial		2273.3	

	Backyard						
1.10	**Fisheries** (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department)	**No. of fishermen**	**Boats**		**Nets**		**Storage facilities (Ice plants etc.)**
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
		27445	64	1	179	1	-
	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		-		-		-	
	B. Culture						
		Water Spread Area (ha)		**Yield (t/ha)**		**Production ('000 tons)**	
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)						
	ii) **Fresh water** (Data Source: Fisheries Department)						
	Others						

Source: Official website of Palakkad, Department Animal Husbandry, Department of Fisheries

1.11 Production and Productivity of major crops (Average of last 5 years: 2004, 05, 06, 07, 08)

1.11	Name of crop	**Kharif**		**Rabi**		**Summer**		**Total**		**Crop residue as fodder** ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										

	Rice	111.9	2322.3	132.3	2480.0	11.9	2561.2	626.9	2454.5	-
Major Horticultural crops (Crops to be identified based on total acreage)										
	Coconut							410.2 million nuts	7057.301 Nuts/ha	
	Plantain							84.0	9778.0	
	Banana							89.0	7757.0	
	Mango							89.4	9520.0	
	Vegetables	Average Area: 8.205 thousand hectares								

Source: Farm Guide, 2011

1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	Rice	Banana	Vegetables
	Kharif- Rainfed	June 1st week		April
	Kharif-Irrigated	-	August	April/May
	Rabi- Rainfed	September - October		September/October
	Rabi-Irrigated	Oct 1st week	September/October	December/ January

1.13	**What is the major contingency the district is prone to?** (Tick mark and mention years if known during the last 10 year period)	Regular	Occasional	None
	Drought	✓		
	Flood			✓
	Cyclone		✓	
	Hail storm			✓
	Heat wave		✓	

	Cold wave			✓
	Frost			✓
	Sea water intrusion			✓
	Pests and diseases (specify)	Rice : **Pests** Leaf folder, rice bug stem borer **Diseases**: Sheath blight, **Weeds** False smut, Infestation 0f *Leptochloa* sp. Vegetables-**Diseases** Damping off (Rainy season) Mosaic (Summer)	Rice : **Pests** BPH **Diseases** Sheath blight	
	Others (Man Animal Conflict) Elephant Attack	✓		

1.14	**Include Digital maps of the district for**	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks (June 3rd Week)	Double cropped wetland	Rice-Rice	No change	Prefer short duration varieties. Prepare mat nursery and adopt community nursery Adopt closer spacing and increase the number of seedlings to 3-4 numbers/hill and give additional N @5 kg/ha Spray of B and K increases drought tolerance. Apply silica Direct seeding of for the first crop	RKVY, NREGS, IWMP
	Single cropped wetland	Rice-Pulses/Banana		--do--	--do---
		Rice-Vegetables			
		Rice- Sesamum			
	Upland (Garden land)	Rice-Banana		Mulching , Organic manuring Sprinkler Irrigation	IWMP, NHM RKVY,NREGS
		Arecanut			
		Banana			
		Coconut- Pepper			

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 (July 1st Week)	Double cropped wetland	Rice-Rice	Short duration rice- Rice Long duration Rice Long duration Rice-Vegetables/ pulses	Wet seeding of short duration varieties Adopt single crop of long duration variety	IWMP, NHM RKVY,NREGS
	Single cropped wetland	Rice-Vegetables	Long duration Rice-Vegetables Long duration Rice-pulses/Sesame		
	Upland (Garden land)	Coconut-Pepper		Micro irrigation/sprinkler	
		Arecanut			
		Banana		Mulching, organic manuring	

Condition			Suggested Contingency measures		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal 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.	Double cropped wetland	Rice-Rice	If delay exceeding 3 weeks, Irrigate at 1 to 4 days using the harvested rain water	Application of P and K as basal, Reduce N dose, Apply bulky organic manures.	NFSM, RKVY,IWMP, NREGS
	Single cropped wetland	Rice-Vegetables	* Drip irrigation *Life saving irrigation *Adopt mixed cropping		
		Rice- Pulses			

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

weeks rainless (>2.5 mm) period)					
At vegetative stage	Double cropped wetland	Rice-Rice	* Foliar application of nutrients *Under semidry situation, wherein sowing is already over, practice thinning of crop stand, reduce plant population and use the biomass as mulch and do interculture using dry land weeder. * Life saving irrigation with available water. *Supply the fertilizer nutrients through foliar application *	*In situ* rainwater conservation, Application of P and K as basal, Reduce N dose. Mulching in garden land, Sprinkler irrigation	NFSM, NREGS, RKVY,IWMP
		Rice-Vegetables			
	Single cropped wetland	Rice- Pulses			
		Banana			
	Upland (Garden land)	Arecanut			
		Coconut/Banana			
At flowering/ fruiting stage		Rice-Rice	* If the rice crop fails it can be cut and converted to use as fodder/silage, wherever possible provide life saving irrigation	--do----	
		Rice-Vegetables			
		Rice- Pulses			
		Banana			
		Arecanut-Pepper			
		Coconut-Pepper			
Terminal drought		Rice-Rice	*. Life saving irrigation by rain gun * Enhance the physiological maturity of the crop * If the crop fails it can be cut and converted to use as fodder/silage	Maintaining the soil in sub-saturated condition, alternate drying and wetting.	NREGS, RKVY, IWMP, NHM
		Rice-Vegetables			
		Rice- Sesamum			
		Banana			
		Arecanut-Pepper			
		Coconut-Pepper			

2.1.2 Irrigated situation

Condition	Major Farming situation	Normal 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		Rice-Rice	Rice (SD)-Rice	Direct sowing of seeds, Avoid transplanting till sufficient water is received. Follow stress irrigation schedule as per package	NREGS, IWMP
		Rice-Vegetables	Rice(SD)-Vegetables		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall		Rice-Rice	Rice (SD)-Rice	*Avoid transplanting till sufficient water is received. *Follow stress irrigation schedule as per package. *Raising community nursery , *Cultivation of drought tolerant varieties like Vaisakh, Swarnaprabha, Samyuktha, Harsha etc *Sowing of paddy nursery at 15 days interval. *If irrigation water available at later stage and transplanting is delayed adopt closer spacing, increase the number of seedlings to 3-4 numbers/hill and give additional N @5Kg/ha * Bund planting/ Fringe cropping with vegetables such as cowpea	NREGS, RKVY, NHM, IWMP
		Rice-Vegetables	Rice(SD)-Pulses		
Condition	**Major Farming situation**	**Normal Crop/cropping system**	**Suggested Contingency measures**		
			Change in crop/cropping system	**Agronomic measures**	**Remarks on Implementation**
Non release of		Rice-Rice	Rice (single	Rain water harvesting, Direct sowing,	NREGS,

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
water in canals under delayed onset of monsoon in catchment		Rice-Vegetables	crop)/Pulses	Delayed sowing	RKVY, NHM, IWMP
		Coconut, Arecanut, Banana	No change	Life saving irrigation, Mulching with polythene sheet, organic mulching	
Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall	Double cropped wet land	Rice-Rice	No Change	Check dams, Percolation pits, Rain water harvesting, Water conservation measures	
	Single crop wet land	Rice-Vegetables	No Change		NREGS, RKVY, NHM
	Upland (Garden land)	Coconut, Arecanut, Banana	No Change		

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

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Rice	Improve drainage facility	Improve drainage facility	*Improve drainage facility, *Cultivation of varieties having seed dormancy, *Harvest the crop at physiological maturity.	Improve storage facility/godowns
Horticulture				
Banana	In case of crop failure (banana, vegetables) plant short duration varieties of vegetables, pulses, oilseeds, minor millets, tuber crops etc provide drainage facilities to perennials,			
Arecanut				

Coconut	store the excess rain water			
Vegetables				
Heavy rainfall with high speed winds in a short span				
Rice				
Horticulture				
Banana, Vegetables	Improve drainage facility			
Arecanut, Coconut	Shelter belts, alley cropping, Improve drainage facility, propping of banana			Improve storage facility
Condition				
Outbreak of pests and diseases due to unseasonal rains	**Suggested contingency measure**			
Rice	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Horticulture				Improve storage facility
Banana, vegetable	Cultivation of resistant varieties, Use disease free healthy planting material. Application of bio-control agents, Use of disease free seeds, Proper seed treatment, Balanced application of fertilizers, Phyto-sanitation.		Harvest the crop at physiological maturity	
Coconut/Arecanut	Remove and destroy severely infected and completely dried leaves, Avoid any sort of root injury through intercultural operations or by nematode infestation, Provide better drainage, provide mulching with polythene sheets or organic materials Grow cover crops in the garden and apply *in situ*. Avoid water stagnation in the garden by providing drainage facilities. Prophylactic spray of 1% Bordeaux mixture with stickers once before the onset of south west monsoon followed by second and third applications at 40-45 days interval. Collect and destroy all fallen and infected nuts.			

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**

inundation				
Rice	* Give proper drainage * Protect the left over crop by gap filling *Shift to direct seeding of short duration varieties if crop fails * If the crop fails and water recedes grow short duration varieties of pulses, oilseeds, minor millets, green manure crops			Harvest the crop at physiological maturity, Cultivation of varieties having seed dormancy
Horticulture				
Vegetables	*Follow raised bed/mount/ridge planting/mount planting			
Banana	Timely cleaning, de-silting and deepening of natural water reservoir and drainage channels, Construction and protection of all the flood protection embankments, ring bunds and other bunds. Dams and levees can also be constructed which can be used as temporarily storing space which reduces the chances of lower plains getting flooded.			
Arecanut/ Coconut				
Continuous submergence for more than 2 days				
Rice	Cultivation flood tolerant varieties, Crop insurance, Improve drainage facility,			
Horticulture				
	Timely cleaning, de-silting and deepening of natural water reservoir and drainage channels, Construction and protection of all the flood protection embankments, ring bunds and other bunds. Dams and levees can also be constructed which can be used as temporarily storing space which reduces the chances of lower plains getting flooded.			
Banana/ Vegetables				
Arecanut/ Coconut				

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			
	* Cultivation of drought resistant fodder varieties like Andropogon and Guinea grass in the fodder plots * Preservation of fodder available as silage or hay for feeding during the	*Feeding straw, hay and silage and at least one third of green fodder *Feeding available tree fodders and other unconventional feed stuffs. *Restrict grazing of animals to cool hours of the day	1. Flushing of all the stock 2. Gradual switch over to normal diet

	drought *Identification of tree fodders in the locality which can be utilised for drought season * Identification of unconventional feed and fodder resources in the locality which can be used in the drought * Cultivating cereal fodder like maize and sorghum in the now available irrigated tract and preserving it as silage for the drought. *Identification of fallow wet lands in the area and to go for grass cultivation as to get fodder even during the drought with existing moisture in the soil. * Breeding all the breedable animals prone to summer infertility or suboesturum like in buffaloes. * Deworming of all stock. *Conservation and storage of water in rain harvesting facilities for the drought season.	*Provide clean, cool drinking water adlibitum or at least four times daily. *Improve the ventilation of existing animal sheds *Spraying of water to large animals during hot hours of the day *Spreading insulatory materials over the roof of the animal sheds *Provide most of the feed and fodder during the cool hours of the day. *Use the waste water from the sheds for irrigating the fodder plots *Use the stored water for cooling the animal and washing and restrict the use of good potable water for drinking.	
Floods			
	* Ensuring the drainage by digging channels from fodder plots to avoid water logging * Deworming of all livestock	*Side curtains to prevent rain water splashing inside the animal sheds especially in goats *Ensure cleanliness to hygiene in sheds with disinfectant applications at regular intervals.	*Repair and cleaning of all the sheds and surroundings *Ectoparasiticidal applications

	* Preventive vaccinations against infectious diseases like Pasteurellosis, Foot and Mouth disease etc * Ensuring proper maintenance of and drainage of dung channels and water logging near the animal sheds. * Ensuring clean and hygienic drinking water for the animals	*Cleaning all channels and water logged areas near sheds frequently and applying disinfectants *Adequate bedding and with straw for young calves *Spraying ecto parasiticides in animals and cleaning the bushes near the sheds. *Attending all calving and proper care to newborns *Cleanliness and hygiene in milking and milk feeding. *Earlier detection and treatment of diseases.	

2.5.2 Poultry

	Suggested contingency measures			**Convergence/linkages with ongoing programs, if any**
	Before the event	**During the event**	**After the event**	
Drought				
	* Preventive vaccinations against Raniket disease, Fowl pox and infectious bronchitis *Deworming of all the birds	*Provide clean cool drinking water at all times adlibitum *Addition of anti-stress agents and antioxidants in the feed *Protection from direct sunlight by curtains on the sides of sheds and otherwise ensuring maximum ventilation *Insulating material spread over roof *Supplementation of minerals and vitamins in the feed	Nil	Can be linked with ATMA, NREGS, RKVY

Floods				
	*Fumigation and disinfection of sheds and spreading dry litter *Deworming of all birds	*Side curtains to avoid splashing of rain into poultry sheds *Changing moist litter occasionally with fresh dry litter *Coccidiostats in the feed *Provide warmth by incandescent bulbs Earlier detection and treatment of diseases	Nil	

2.5.3 Fisheries

Aquaculture	**Suggested contingency measures**			**Convergence/linkages with ongoing programs, if any**
	Before the event	**During the event**	**After the event**	
Drought				
	*Deepening of tanks *Strengthening of bunds *Low stocking density	*Partial harvesting *Water quality Checking *Release of water from reservoirs	*Pond preparation for the next crop *Shift to other crops if possible	
Floods	*Strengthening of bunds *Construction of pond above ground level	*Partial harvesting *Bye pass the incoming water	*Drain off the water *Prepare for the next crop	

Capture Fisheries	**Suggested contingency measures**			**Convergence/linkages with ongoing programs, if any**
	Before the event	**During the event**	**After the event**	
Drought	*Deepening of tanks *Strengthen the check dam *Rainwater harvesting system	*Harvest fishes *Release water from stored tanks	*Loss or damage may be assessed and reported	Can be linked with ADAK,FFDA, Matsya Keralam

	*Collect water from irrigation reservoirs in tanks			
Floods	Nil	*Take off the nets from vulnerable area	*Assess the loss and report the damage	