ANNUAL PROGRESS REPORT

(2023-24)

AGRO MET FIELD UNIT, KAKDWIP

BIDHAN CHANDRA KRISHI VISWAVIDYALAYA, REGIONAL RESEARCH STATION, KAKDWIP

GRAMIN KRISHI MAUSAM SEWA, IMD, NEW DELHI

PREFACE

Availing this rare opportunity and privilege I feel elevated to express my deepest sense of indebtedness and veneration to the Vice Chancellor, Director of Research, Comptroller & Assistant Comptroller for extending all possible help and support during the entire period of execution of the mandate of the Agro Met Advisory Service.

All Scientists of this station are duly acknowledged for rendering their sincere and I sincerely appreciate the contribution of all scientists of RRS, Kakdwip for their hard working support in achieving the sent out objectives of the project. Beside this to fulfill the main objective for performing field visit and organizing Farmer Awareness Programme within 31st March 2024, I am expressing my deepest thanks to Comptroller Section, B.C.K.V. for smooth processing of every financial matter.

I do sincerely hope that this Annual Progress Report (2023-24) will be a testimony of the performance of the project. Beside this Agro met Advisory Service Bulletin, SMS and different awareness programmes on weather, climate and its impact on crops, animal husbandry and fishery which is to helpful and beneficial for the farming community.

Finally, I am thankful to all my colleagues for their sincere help and cordial Co-operation in all aspect for bringing out the publication of this Annual Progress Report.

Agro-Met Field Unit
Coastal Saline Zone
Kakdwip, 24-Pgs (S)

A. K. Senapati
Nodal Officer

Important information about project, Nodal Officer and Technical Officer

NAME OF THE PROJECT:

AMFU, Kakdwip under GKMS sanctioned by MoES, IMD Letter No. ASC/WB-22/06/HQ-2008 dt. 15.05.2008. This Project is implemented by Bidhan Chandra KrishiViswavidyalaya on 01.06.2008 at Regional Research Station (CSZ), Kakdwip, West Bengal.

Name of the Nodal Officer	Prof.Arun Kumar Senapati
E-mail ID	senapatiarunkumar@yahoo.com
Mob,:	09474449438
Address	Po.: Akshaynagar(Kakdwip), Dist.: 24-Pgs(S), WB, Pin: 743347
Name of Technical Officer	Dr. ShibaniChowdhury
E-mail ID	shibani.bckv@gmail.com
Mob	07003311742
Address	Po.; Akshaynagar(Kakdwip), Dist.: 24-Pgs(S), WB, PIN: 743347

4 DETAILS OF MANPOWER:

Nodal Officer	Professor in Agril. Entomology
TO	Permanently recruited Technical Officer and she is Doctorate in Agril. Meteorology & Physics.
Date of Joining	01.12.2015
Present pay	Basic- 73,000/-, AGP-6,000/-, H.R.A.-5348/-, DA-42% w.e.f. 1.7.2021
Name of the Agro-Met field Observer	Sri Biswajit Kar
Present Pay	Consolidated Pay Rs. 9200/-per month
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Address	Po.; Akshaynagar(Kakdwip), Dist.: 24-Pgs(S), WB, PIN: 743347

Latest updated status of AMFU, Kakdwip regarding all correspondence:

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		Comptroller	(033)25870523		comptrollerbckv@gmail.com	Bidhan Chandra KrishiViswavidyalaya P.O. Mohanpur, Dist. Nadia, PIN:741252
S. No.	Name of Stations AMFU, Kakdwip	**Prof. Arun Kumar Senapati** Name of in-charge		9474449438	senapatiarunkumar@yahoo.com	Bidhan Chandra KrishiViswavidyalaya P.O. Akshyanagar, Dist. South 24 Parganas, PIN:743347
		Prof. Saon Banerjee Principal Nodal Officer		9433605287	Sbaner2000@yahoo.com	Bidhan Chandra KrishiViswavidyalaya P.O. Mohanpur, Dist. Nadia, PIN:741252
		Prof. Arun Kumar Senapati Nodal Officer		9474449438	senapatiarunkumar@yahoo.com	Bidhan Chandra KrishiViswavidyalaya P.O. Akshyanagar, Dist. South 24 Parganas, PIN:743347
		Dr. ShibaniChowdhury Technical Officer		7003311742	Shibani.bckv@gmail.com	Bidhan Chandra KrishiViswavidyalaya P.O. Akshyanagar, Dist. South 24 Parganas, PIN:743347
		Mr. BiswajitKar Agromet Observer		7797124396	biswajitk8539@gmail.com	Bidhan Chandra KrishiViswavidyalaya P.O. Akshyanagar, Dist. South 24 Parganas, PIN:743347

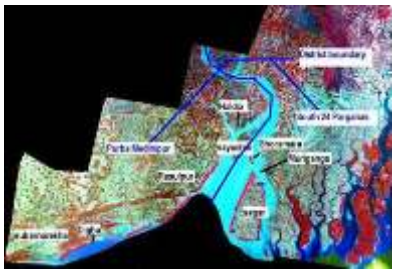
INTRODUCTION

Agro Met Field Unit:

Agro Met Field Unit (Coastal Saline Zone, Kakdwip) of Bidhan Chandra KrishiViswavidyalaya is situated at the South Eastern part of the state lying between 22''40'38.95" N latitude and 88°18'33.27" E longitude with a mean sea level of 7 m., at Kakdwip, 35 km away from the Bay of Bengal and beside 117 NH. Nearby railway station is Kakdwip and nearby bus stop is Kakdwip. No airport is available there. The Agro-Met Field Unit under Integrated Agro-Met Advisory Service (IAAS) newly named as Gramin Krishi MausamSewa (GKMS), implemented on 1st June, 2008 to provide medium range weather forecasting and weather based agro advisory for the farmers, based on present weather condition, current phonological stage of all field crop including horticulture crop, and forecast of disease pest attack. The GKMS project provides information about alternate crop cultivation during adverse weather condition. Through AAS bulletin this project advised the farmers about contingency planning to overcome the loss due to destruction of crop due to heavy rain or draught. For enhancing the livelihood of farmers GKMS suggested the farmers to practice small scale farming, poultry farming, duckery, piggery and goatary. Beside this the GKMS project arrange of Farmer Awareness Programme, farmers meet, field visit, feedback collection, preparation of whatsApp group for keeping direct contact with farmers and alert the farmers through SMS to popularize this project. From last two years GKMS project also provide information about NDVI and SPI data along with AAS bulletin. Total number of bulletins disseminated in the year 2017 was 95 and the total number of farmers benefitted by SMS service is 17916747 (Source: Kisan portal). The AAS bulletin are disseminated to all the BDOs of both South 24 Parganas and PurbaMedinipur, NGOs, Doordarshan Kolkata, KVKs, different agencies and web cell of Bidhan Chandra KrishiViswavidyalaya.

Coastal Saline Zone of West Bengal (South 24 Parganas and Purba Medinipur

The coastal saline area in West Bengal is about 1.394 million hectare comprising whole



of South 24-Pargana(29 blocks and 2251 villages) and PurbaMedinipur(25 Blocks) district (3584 villages) and few blocks of each of North 24-Parganas and Howrah districts. The length of the coastline in West Bengal is

220 km with a coastal zone inland and up to the landward extension of the successive series of older sand dune stretching up to Orissa Coast Canal in the western part which serves as the boundary of the Sundarban Biosphere Reserve, of about 9,630 square km. The coastal zone supports an approximate population of 7 million. Total Geographic area of South 24 Parganas is 953.37 ha and total cultivable land is 380.46ha.

Important Coastal Habitats (Living and nonliving:Sundarban with an area of about 10200 square kilometer of mangrove forest extends over two countries India (4,267 sq.km.) and Bangladesh (6,000 sq.km.). Out of this area of 4,267 sq. km., about 2,300 sq.km. is under forest canopy. An additional 5,400 sq.km.non-forest (reclaimed forest) huma 2 bited area along the north and northwestern fringe of mangrove forest within the Indian territory is also known as Sundarban.

The dominant flora of Sundarban is the mangrove. Many rivers run across the Sundarban and falls into the Bay of Bengal. The Sundarban is surrounded by a very densely populated area, therefore human pressure is important. Around 1.2 million local users reside seasonally in the area for fishing and other resource use activities.

South 24 Parganas	**East Midnapore:**
Area 9,960 Km2	Area 4,736 Km2
Population 8,153,176	Population 5,094,238
Density 820 / Km2	Density 1,100 / Km2
Source: Coastal West Bengal Development Council	

Ground water scenario of Coastal Saline zone of West Bengal:In the coastal area of West Bengal a clay blanket of 20 – 30m thickness is generally present below which brackish water aquifers occur within 120 m depth in the western part of Hugli river and within 150 – 180 m in the eastern part of it. A group of fresh water aquifers occur in coastal tract of East Medinipur within the depth span of 120-360 m sandwiched between saline/brackish water aquifers. The distribution of salt water – fresh water aquifers in the coastal tract is generally uniform with fresh ground water overlying saline ground water underneath. All the aquifers are recharged by monsoon rain but the piezometric surface of the deep aquifer is depressed by 9 metres during January to March due to heavy withdrawal for cultivation. Increasing demand and

drawal of ground water from the deep aquifer, there is real threat of saline water ingression if excessive withdrawal is regulated.

Climate of this Zone Climate of this zone is sub-tropical humid. Mean annual rainfall of this zone is 1763 mm which ranges between 1450-1925 mm. Maximum rainfall (75.80%) is received during the South-West monsoon season (June-Setember). 1-3.5% of the total rainfall is received during summer months (February-May). Sudden and occasional rainfall is also occurred due to the influence of North-West current during April-May which aids to the summer crops. Heavy rains occur during the month of July-August followed by serious water stagnation which leads to damages of rainy seasons paddy of this monocropped area. Occasional depression in the Bay of Bengal in the month of October and during the first fortnight of November may also occur. It causes a severe crop damage to the early maturing rice varieties. Due to cloudy weather the bright sun shine hour per day is very low in the month of August to September which leads to less photosynthetic activity of the crop. The mean monthly maximum and minimum temperature fluctuates from 32.50^{o}C to 15.5^{o}C. The climate is normally hot except for a short winter span during December to January. The temperature is the lowest in January and rises rapidly during February onwards and causes premature flowering of the crop.

Problems of Coastal Saline Zone of West Bengal:

Soil erosion: The shoreline between the Subarnarekha and the Rasulpur deltas is characterised by sand dunes and a wide sandy beach. Several small tidal creeks cross the shore, the largest being the Shankapur Creek east of Digha. From a time series analysis by the Researchers from School of Oceanography, Jadavpur University it was found that erosion zones are most prominent among the 12 sea facing southern islands from Sagar to the west to Bhangaduni in the east and southwestern corners of the islands are particularly susceptible to sustained erosion. Within the island system, the Sagarisland has suffered the bulk of erosion with an areal loss of 30 sq. km. with marginal accretion.
The net loss in land area in the eastern part of West Bengal coastal zone is probably due to erosion and/or submergence attributed to sea level rise consequent upon recent climate

change and global warming. Therefore, in this sector of West Bengal coast coastal erosion is a key issue in coastal zone management.

Climate change and sea level rises: Global climatic change induced by high concentration of carbon dioxide in the atmosphere that includes warmer climate, melting of glaciers, sea level rise, increase in incidences of tropical cyclonic storms, etc. are issues particularly relevant to Sundarban and other coastal areas of West Bengal. A 45 cm rise in global sea levels would lead to the destruction of 75 percent of the Sundarban mangroves. Along with global sea level rise, there is a continuous natural subsidence in the Sundarban, causing a rise of about 2.2 mm per year. The resulting net rise rate is estimated at 3.1 mm per year at Sagar. Jointly, the sea level rise and lower freshwater flow in winter will also result in increased salinity in the area, threatening the conservation of the Sundarban mangroves.

Natural disaster: The east coast of India is prone to incidences of cyclones.The probable maximum storm surge in metres that expected is as follows: Contai :12.5, Sagar: 11.5 Moore Island: 8.5.

Seawater intrusion in paddy fields due to failure of embankments:

Agriculture is extensively practiced in coastal areas of West Bengal. In the near absence of any surface water irrigation scheme and as ground water occurs at considerable depth, the agriculture is dependent on monsoon rainfall. However, the meso and macro tides along the West Bengal coast coupled with storm surges during the cyclone months tend to flood the agricultural fields with brackish to salt water. Once a field is polluted with brackish water it takes several monsoon seasons to wash out the salt from the soil back into the creeks so as to make the area suitable for agriculture.

Livelihood of Coastal saline Zone:

The major part of coastal areas of West Bengal is rural in nature. These activities include agriculture, fishing, collection of minor forest produce in Sundarban, dairy and poultry development activities, small scale retail trading and service sector activities. In and around Digha, the local people are engaged in various professions related to tourism inclusive of the transport sector employment. Self employed rural artisans of various handicraft products are a small group having a difficult livelihood.

Source: Integrated Coastal Zone Management Project , Department of Environment, Govt. of West Bengal

Major crops grown in Coastal Saline Zone of West Bengal

Season	Cereals	Pulses and oil seed	Vegetables and tubers	Fruit and plantation	Cash crop
Summer		Green gram, Black gram, Sesame	Okra, brinjal, pointed gourd, bitter gourd, snake gourd, cucumber, red amaranthus	Mango, litchi, guava, jackfruit, coconut, sapota, cashew nut	Betel vine
Kharif	Aman paddy		Elephant foot yam, aurum, ginger, turmeric	Coconut, papaya, banana	Betel vine
Rabi	Boro paddy	Lentil, *lathyrus*, sunflower, mustard, pea	tomato, Potato ,cabbage, cauliflower, onion, Raddish	Sapota, watermelon	Betel vine

ANNEXTURE-1

Season wise weather condition of South 24 -Parganas in the year 2023-24

Weather condition of South 24 -Parganas from 1st April, 2023to 31st March, 2024

The weather scenario of South 24-Parganas is quite variable. In Summer season Maximum temperature varied from 28.0^{0}C to 40.0^{0}C and the minimum 15.0^{0}C to 23.5^{0}C throughout the selected period. During winter season Maximum temperature varied from 24.5^{0}C to 36.5^{0}C and minimum temperature varied from 9.0^{0}C to 18.5^{0}C. Lowest minimum temperature was recorded during the winter on February 2024).

The overall scenario of rainfall pattern showed that very good pre monsoon rainfall was received on April May (240.4 mm). Total rainfall received from June to September was 1060.0 mm preferably maximum rainfall was received in the month of September (478.0mm). The humidity range is varied from 83% to 96% throughout the selected period. Less humidity was recorded during spring month (83% in March, 2024) and maximum value was recorded during monsoon (96% in June and July).

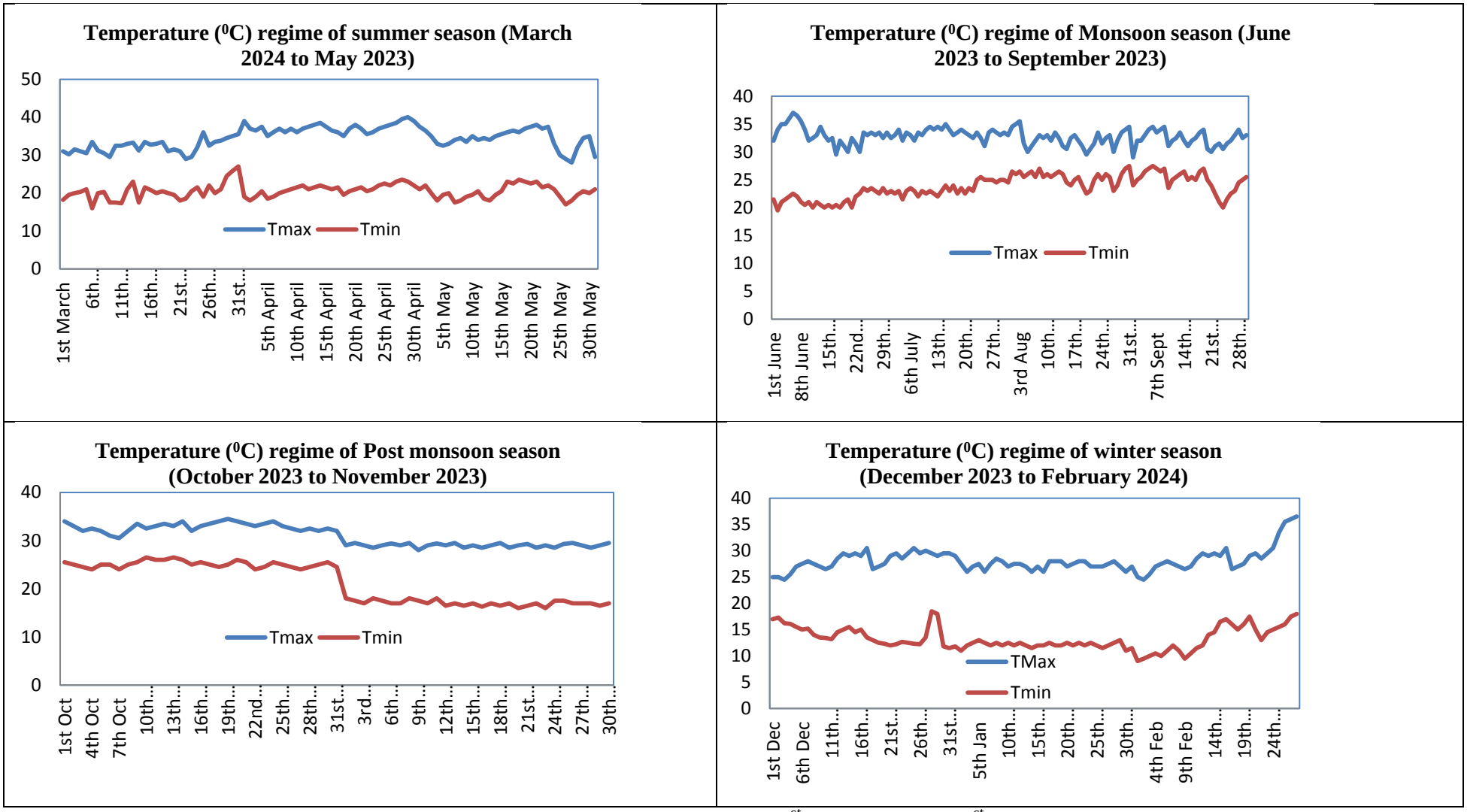


Fig: 1.1 Season wise nature of maximum and minimum temperature (1st April, 2023 to 31st March, 2024)

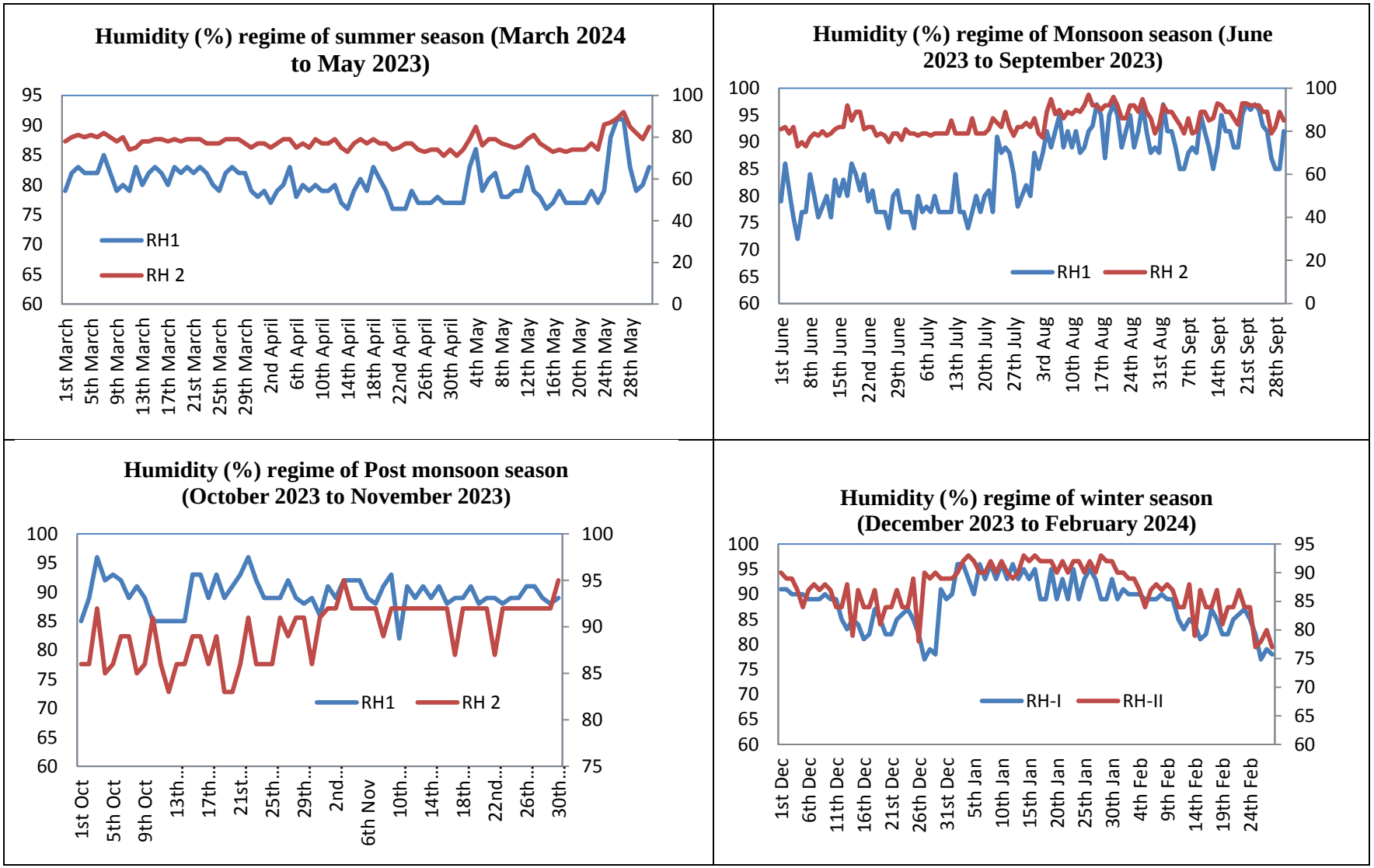


Fig: 1.2 Season wise nature of humidity (%) (1st April, 2023 to 31st March, 2024)

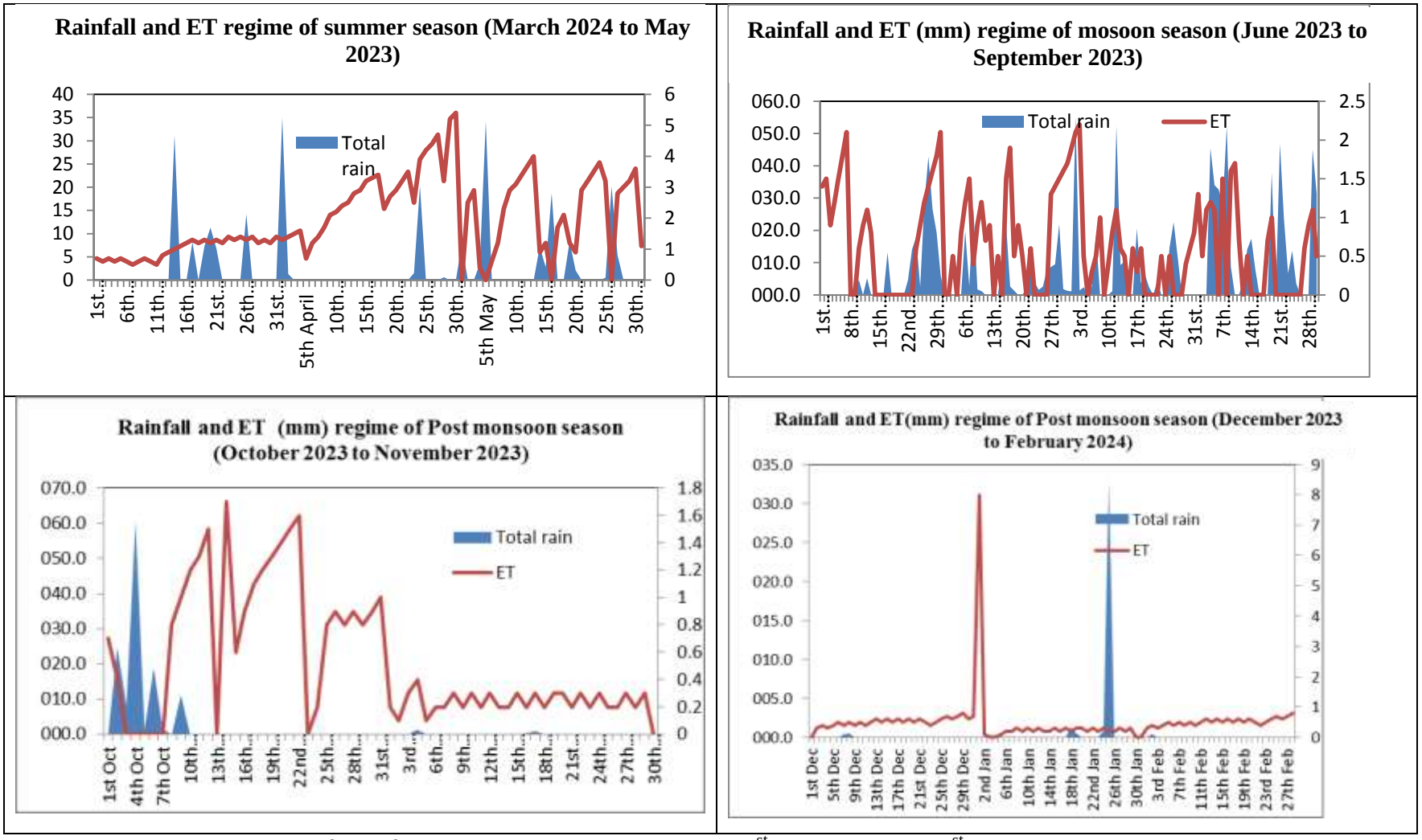


Fig: 1.2 Season wise pattern of Rainfall and evapotranspiration (mm) (1st April, 2023 to 31st March, 2024)

ANNEXTURE-2

Verification of medium range weather forecast

Verification of the medium range weather forecast

Medium range weather forecast of 5 days was received twice a week, i.e., on every Tuesday and Friday forenoon from Super Computer centre, National centre for Medium Range Weather Forecasting (NCMRWF), D.S. & T., New Delhi. For the purpose of verification study, the weather forecasts so obtained during the period under study were divided into 4 seasons namely-

- Winter
- Summer
- Monsoon
- Post monsoon

The verification study was carried out by taking into account both forecast and observed weather data. The analysis of data was done following the methodologies given by NCMRWF, New Delhi. Both the qualitative and quantitative verification studies were conducted by using skill scores and critical values for error structures. Verification study was done for the following meteorological parameters, which were supplied by the NCMRWF.

- Rainfall
- Wind speed
- Maximum Temperature
- Minimum Temperature
- Relative humidity

Verification methods:

Weather forecast of the center was analyzed for verification following the meteorologies given by NCMRWF (1999) through their publication entitled Guide for Agrometeorolgical Advisory Services.

For rainfall analysis, the quantitative analysis was conducted on YES/NO basis. In this case, the analysis was done by examining whether the event occurred or not as per the forecasts received. In case of qualitative analysis of rainfall forecast, ratio score, Hanssen and Kuipers score (H.K. score) and other was determined using 2X2 contingency table. The quantitative verification analysis was carried out using critical values for error structure.

Table: 3 verification result of maximum temperature analysis

Parameters	Pre-Monsoon	SW-Monsoon	Post-Monsoon	Winter	Annual
RMSE value	2.91	2.39	2.35	3.31	2.68
'r' value	0.19	0.28	0.68	0.49	0.78
Ratio score/ Hit score (%)	100	100	100	100	100
Critical Success Index/ Threat score	1.00	1.00	1.00	1	1.00
Error structure (%)					
Correct	21.67	31.71	20.65	13.79	23.72
Usable	72	66.67	79.35	75.86	72.67
Unusable	6.67	1.63	0	10.34	3.6

Table: 4 verification result of minimum temperature analysis

Parameters	Pre-Monsoon	SW-Monsoon	Post-Monsoon	Winter	Annual
RMSE value	6.71	4.62	3.37	4.76	4.81
'r' value	-0.29	-0.45	0.87	0.58	0.84
Ratio score/ Hit score (%)	100	100	100	100	100
Critical Success Index/ Threat score	1.00	1.00	1.00	1	1.00
Error structure (%)					
Correct	0	9.76	7.61	1.72	6.04
Usable	23	58.54	51.09	32.76	45.62
Unusable	76.67	31.71	41.3	65.52	48.34

Table: 5 verification result of relative humidity analysis

Parameters	Pre-Monsoon	SW-Monsoon	Post-Monsoon	Winter	Annual
RMSE value	2.91	2.39	2.35	3.31	2.68
'r' value	0.19	0.28	0.68	0.49	0.78
Ratio score/ Hit score (%)	100	100	100	100	100
Critical Success Index/ Threat score	1.00	1.00	1.00	1	1.00
Error structure (%)					
Correct	21.67	31.71	20.65	13.79	23.72
Usable	72	66.67	79.35	75.86	72.67
Unusable	6.67	1.63	0	10.34	3.6

Results of verification of medium range weather forecasting

1. . MAXIMUM TEMPERATURE

In case of maximum temperature, the percentage of correct cases was highest during South-monsoon season followed by pre-monsoon and winter respectively. When correct and usable cases were considered together it has been observed that the success of forecast of maximum temperature ranges between 89.65 for winter and 100 for Post- monsoon.

The "r" value for Post monsoon season is significant (0.68) although the same for other seasons are not significant.

2. MINIMUM TEMPERATURE

In case of minimum temperature, the percentage of correct cases was highest during SW-monsoon season (9.76) followed by post-monsoon and winter seasons respectively. When correct and usable cases were considered together it has been observed that the success of forecast of minimum temperature ranged between 23 for Pre Monsoon and 68.3 for South west monsoon season.

The "r" value for post-monsoon (0.87), and winter season is significant (0.58) although the same for other two seasons are not significant.

3. RELATIVE HUMIDITY

The results of verification of RH forecasts have been presented in table-5. The correct forecast varies between 31.71% for South West Monsoon and 13.79% for winter.

ANNEXTURE-3

Contingency planning for adverse weather events

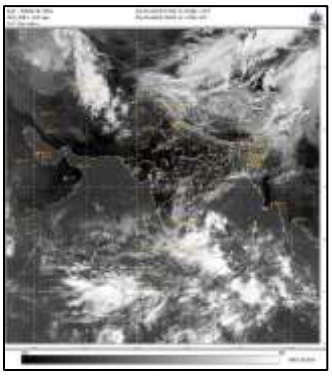
In the last week of April ,2023 maximum temperature reached around 40.0^{0}C , special advisories were disseminated for preventing high temperature stress in crops.

Warning issued by IMD on 29.4.23

In anticipation of approach of upper air westerly trough and moisture incursion from Bay of Bengal, enhance thunderstorm with lightning activity along with gusty wind likely over the districts of West Bengal during 29th April to 03rd May,2023. From 2nd to 3rd May thunderstorm with lightning likely to occur at one or two places over the districts of South Bengal. Farmers are advised to complete boro paddy harvesting, threshing, drying as early as possible. Follow nowcast and meghdoot app for getting more updated weather forecast information and keep the life safe from lightning.

Cyclone alert issued by IMD on 4.5.23

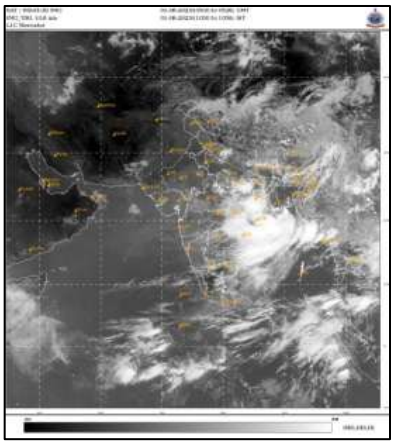
A cyclonic circulation is likely to develop over Southeast Bay of Bengal around 06th May, 2023.



Under its influence a low pressure area is likely to form over the same region around 07th May. It is likely to concentrate into a depression over Southeast Bay of Bengal on 08th May. Thereafter, it is likely to intensify into a cyclonic storm while moving nearly northwards towards central Bay of Bengal. The details of its path and intensification will be provided after the formation of low pressure area. Farmers are requested to follow nowcast and meghdoot app for getting more updated news of advancement and nature of cyclone and keep the life safe from lightning. As cyclone alert is there immediate complete harvesting within 9th May.

Heavy rainfall alert issued by IMD on 1.8.23

The Depression over Northeast Bay of Bengal moved north-northwestwards with a speed of 25kmph, intensified into a Deep Depression and lay centred at 0830 hours IST of today, the 1st August, 2023 over the northeast Bay of Bengal off Bangladesh coast near latitude 21.2 degree N and longitude 91.2 degree E, about 160 km east-southeast of Khepupara (Bangladesh) and 420 km east of Digha (West Bengal). It is likely to move northwestwards and cross Bangladesh coast close to east of Khepupara by evening of today, the 1st August. Thereafter, it is very likely to move west-northwestwards across Gangetic West Bengal during subsequent 24 hours.



Forecast: Widespread rainfall along with thunderstorm and lightning is very likely over the districts of South Bengal during 01 st – 02nd August,2023. As heavy to very heavy rainfall is predicted 1st and 2nd August transplanting and fertilizer application should be postpond for two days. After two days depending upon the situation transplanting should be continued. Prepare drainage system for main field as well as nursery bed with growing seedlings , betel vine garden and winter vegetables seedling area. Keep the cattle and poultry bird under safe place.

WARNING: SOUTH BENGAL

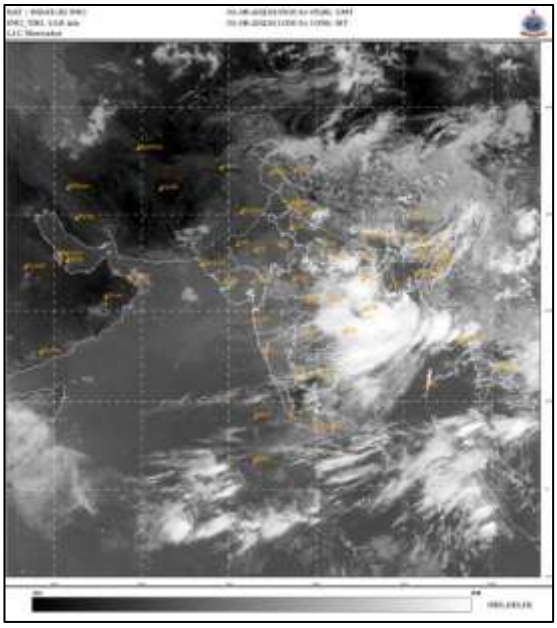
WARNING: SOUTH BENGAL Rainfall: 01.08.2023

(RED WARNING) Heavy to very heavy rain (07-20 cm) with extremely heavy(>20 cm) is very likely at one or two places over South 24 Parganas, East & West Midnapore, Jhargram districts.

Impact based forecast (IBF) for Agriculture for South 24 Parganas and East Medinipur district, West Bengal (based on the forecast issued on 1-08-2023)

Warning issued by IMD on 31-07-2023

The Depression over Northeast Bay of Bengal moved north-northwestwards with a speed of 25kmph, intensified into a Deep Depression and lay centred at 0830 hours IST of today, the 1st August, 2023 over the northeast Bay of Bengal off Bangladesh coast near latitude 21.2 degree N and longitude 91.2 degree E, about 160 km east-southeast of Khepupara (Bangladesh) and 420 km east of Digha (West Bengal). It is likely to move northwestwards and cross Bangladesh coast close to east of Khepupara by evening of today, the 1st August. Thereafter, it is very likely to move west-northwestwards across Gangetic West Bengal during subsequent 24 hours.



Forecast: Widespread rainfall along with thunderstorm and lightning is very likely over the districts of South Bengal during 01st – 02nd August,2023. As heavy to very heavy rainfall is predicted 1st and 2nd August transplanting and fertilizer application should be postpond for two days. After two days depending upon the situation transplanting should be continued. Prepare drainage system for main field as well as nursery bed with growing seedlings , betel vine garden and winter vegetables seedling area. Keep the cattle and poultry bird under safe place.

IBF & Agromet Advisories based on the forecast issued on 1-08-2023

Name of the crop	**Stage**	**Forecast of Extreme weather event**	**Advisory**
Aman Paddy	Transplanting	Heavy to very heavy rainfall along with thunderstorm and lightning	• As heavy to very heavy rainfall is predicted 1st and 2nd August transplanting and fertilizer application should be postpond for two days. After two days depending upon the situation transplanting should be continued. • Immediately arrange proper drainage system in main field as well as standing seed bed. • Complete transplanting of up and medium land area within 15th August.
winter vegetables	Seedling	do	Prepare drainage system for main field as well as nursery bed with growing seedlings
Cattle, poultry bird	All stages		• Keep them under safe place • Restrict grazing for preventing lightning attack

Impact based forecast (IBF) for Agriculture for South 24 Parganas and East Medinipur district, West Bengal (based on the forecast issued on 12.9.23)

Forecast on 12.9.23

As per extended range forecast and medium range weather forecast heavy rainfall is predicted from 13.9.23 to 15.9.23

IBF & Agromet Advisories based on the forecast issued on 12-09-2023

District	Crop	Stage	Likely Impact on crop	Advisory
South 24 Parganas, East Medinipur	Rice	Tillering	• Water stagnation	• Maintain the water level in low land area • Arrange the bund properly to allow the optimum water level in the field • Keep stop top dressing and any type of spraying for 2-3 days
	Early winter vegetables	Vegetative	Water stagnation	• Arrange proper weed free furrow for quick removal of water. • Don't allow water stagnation condition. • Apply any fungicide for preventing wilting during sunny days after rain.
	Betel vine			• Arrange proper drainage system for easy removal of water as moderate to heavy rainfall is predicted in next 4 days. • When weather remain clear only then apply 0.5% Bordeaux mixture throughout the whole plant for preventing angri disease. •
	Poultry			• Arrange proper light treatment for new born chicks • Keep the litter dry and thin. • Apply lime in the litter to prevent fungal attack.

				• Apply dry mesh only for feeding purpose • Follow proper vaccination for broiler.
	Cattle	Mature cow	Worm attack and foot and mouth disease	• Foot and mouth disease for exotic cow in rainy season • Keep the cow shed clean and dry. • Cover the opening with mosquito net and arrange one fan inside the shade. • Wash the wound with potassiumper manganet solution and follow proper dewarming twice yearly.

ANNEXTURE-4

Farmer's meet , field visit and awareness program

Name of programme	**Farmers Meet and field visit**
Date	10.8.23
Period	One day
Village and block	**Budhakhali Village of Namkhana Block**
Subject	• Effect of above normal rainfall on aman paddy in transplanting stage. • Planning of transplanting for preventing sheath blight disease. • Follow proper spacing so that sunlight can enter into the canopy and prevent sheath blight disease. • Weed should be controlled on the bund. As weeds are the alternate host of sheath blight . • Follow proper vaccination of goats
Date	14.9.23
Period	One day
Village and block	**Bhagbatpur village of Patharpratima block**
Subject	• Effect of heavy rainfall on aman paddy in tillering stage. • Don't use excessive urea fertilizer as it makes the plants more susceptible for disease and more vegetative growth makes the plants bend during peak tillering and panicle initiation stage. • Excessive vegetative growth leads to delay in panicle initiation.
Name of programme	Visit in Poultry farm
Date	14.9.23
Period	One day
Village and block	Dakshin Chandranagar village of Namkhana Block
Subject	• Preventing fungal attack in poultry house. • Follow proper heat treatment for day old chicks to increase immunity.
Name of programme	Visit in Animal husbandry
Date	14.9.23
Period	One day
Village and block	Dakshin Chandranagar village of Namkhana Block

Subject	• Care during monsoon period for foot and mouth disease. • Follow proper dewarming yearly.
Name of programme	Visit in aman paddy field
Date	21.9.23
Period	One day
Village and block	Dakshin Chandranagar village of Namkhana Block
Subject	• Why plants in peak tillering stage bend towards ground. • Treatment for leaf roller attack.

Budhakhali Village of Namkhana Block (10.8.23)

Bhagbatpur village of Patharpratima block (14.9.23)

Dakshin Chandranagar village of Namkhana Block (21.9.23)

Name of programme	Farmers Meet and field visit
Date	16.11.23
Period	One day
Village and block	**Shyambasurchak village at block Kulpi**
Subject	• Heavy rainfall alert from 17th to 19th November. • Advise them to complete harvesting of 80% mature aman paddy and postponed any spraying during that period. • Advise to Postponed sowing of early variety of mustard
Name of programme	Farmers Meet and field visit
Date	29.11.23
Period	One day
Village and block	**Dakshin Chandranagar village at Namkhana block**.
Subject	• Advice not to spray any pesticide for spodoptera attack on harvested aman paddy as it is harmful for mature paddy grain. • Prepare field for potato planting depending upon the available moisture
Name of programme	Farmers Meet and field visit
Date	28.12.23
Period	One day
Village and block	**Budhakhali village at Namkhana block**.
Subject	• Advisory for preventing fungal blast at seed bed of boro paddy • Advise for preventing downey mildew of cucurbits as there was observed temperature fluctuation and morning fog.
Name of programme	Farmers Meet and field visit
Date	30.12.23
Period	One day
Village and block	**Bhubannagar village at Partharpratima block**.
Subject	• Advisory for preparation of land for boro paddy transplanting. • Advise for preventing downey mildew of cucurbits as there was observed temperature fluctuation and morning fog.

Farmers Meet and field visit , 16.11.23, **Shyambasurchak village at block Kulpi**

Farmers Meet and field visit , 29.11.23, **Dakshin Chandranagar village at Namkhana block**.

Farmers Meet and field visit , 28.12.23,**Budhakhali village at Namkhana block**.

Farmers Meet and field visit 30.12.23 **Bhubannagar village at Partharpratima block**.

REPORTS OF

FARMERS' AWARENESS PROGRAMME

01.02.24

Organized by
Agromet Field Unit, Kakdwip,
Bidhan Chandra KrishiViswavidyalaya

Sponsored by
India Meteorological Department, New Delhi

Venue:
Kakdwip block, Akshyanagar village, 24-Pgs(S),WB

Introduction: The Farmers' Awareness Programme on climate, weather and crops was held at Dakshin Gopalnagar Village, Patharpratima block, 24-Pgs(S) on 27.12.23. Around 54 farmers were attended the programme. The main topic of this programme was the effect of disease pest infestation on different crop stage, role of weather based Agro-advisory for crop development and introduction of different weather App. The Nodal Officer Prof. A.K. Senapati, the Technical officer, Dr. Shibani Chowdhury and many progressive farmers were present there in the programme.

Professor A.K. Senapati: **Prof. Senapati** gave the brief introduction about Gramin Krishi Mausam Sewa , AMFU, Kakdwip. Farmers faced a lot of difficulties during boro paddy cultivation. Prof. Senapati discussed the solution step by step according to the requirements of farmers. In every year farmers faced a lot of difficulties during both Boro and Kharif paddy cultivation. The common problem of boro paddy seed bed is extreme low temperature during nursery period. He suggested them some special technique to protect the seedlings from extreme low temperature. In January 2024 minimum temperature reached at 9^0C. He suggested some special care to prevent the low temperature shock.

Some special management for preventing the sprouted seed and seedlings from low temperature and fog

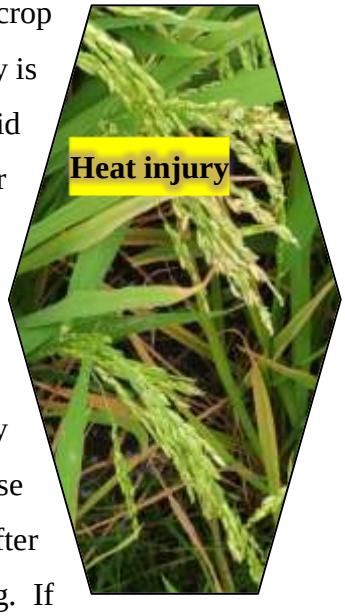
- After sowing of sprouted seed maintain minimum water layer and apply straw ash for preventing temperature.
- For healthy seedlings follow water treatment
- If seed bed area is very less making a shade of transparent polythyne and remove it during sunshine hours.
- After 3-4 days of sowing irrigate the drainage channel of seed bed to keep the soil soft in the seed bed, never irrigate the bed directly.
- Keep under regular observation of field. If seedlings become yellowish or reddish apply fungicide like Mancozeb or Diethane M-45 or mixture of Metalaxil and Mancozeb etc.
- To enhance the growth of seedlings apply chelated Zinc 12% @ 1g per liter of water
- For preventing blast remove the morning fog and dew from seedlings at morning hours by stirring with bamboo stick.

- If seedlings attacked by blast apply Tricyclozole 75 WP@1g per liter of water.
- As per necessity basis apply Potash fertilizer @ 50g per decimal and restrict urea application and follow irrigation at 4 days interval.

- Before 7 days of uprooting the seedlings for transplanting apply pesticide for preventing pest attack in seed bed and if temperature shows higher than the normal then apply urea @300g per decimal.

Next he briefly discussed about the most important disease known as blast both fungal and bacterial. Blast is a weather dependent disease. Professor Senapati gave more emphasis on seed treatment by Streptocyclene and Diethane M-45 etc. Seed treatment is like vaccination to prevent blast disease. This blast disease is caused mainly due to large day night temperature difference along with foggy weather. For preventing blast attack apply a mixture of Streptocyclin @5g per liter of water and Tycyclozole@6g per liter.

Prof. Senapati suggested the farmers to collected seed from certified agency so that they never supply polished old seeds with less germination percentage. Another technical way to prevent blast attack is to change the crop planning. Santoshi variety of boro paddy is more favorable for blast attack so avoid the cultivation of this variety year after year and also avoid congested transplanting for proper entry of sunlight and air inside the row. Prof. Senapati alert the farmers not to apply urea unnecessarily and avoid dense planting otherwise plants become more susceptible for blast attack. After panicle initiation temperature has an important role for grain filling. If



temperature is more than 35^0C with hot air in boro season it prohibits cross pollination and as a result chaffy grain produced. Beside this extreme hot weather just after low temperature period caused node blast or neck blast which restrict the nutrient supply to the grain and the panicle with grain at milk stage turned into white with blackish colour at the base of pannicle. Prof. Senapati clearly discussed the symptom of node blast or neck blast, that is at the base of panicle , 1 to 2inch area brownish and flag leaf turn whitish. Symptoms look like stem borer attack but the panicle canot be easily pulled up. He suggested the farmers to keep standing water during panicle initiation to milk stage and apply one spray of potash fertilizer before panicle initiation to increase the immunity. At panicle initiation stage just, before brusting of panicle apply one fungicide :trade name: Amister Top. After flowering restrict any spraying for 7 days, because movement inside the field with fully flowering stage hamper pollination which resulting chaffy grain. Professor Senapati prescribed the farmers to apply compound fungicide Amister Top (Chemical composition : Azoxystrobin and Diphenoconazole) 1ml per liter of water and SAAF (Chemical composition : Mancozeb and Carbendazim) @2g per liter of water for panicle blast and node blast attack. Mix these two fungicide solution together in right composition and apply in clear weather condition. He also suggested the farmers for early sowing to avoid the heat wave situation during March April. Sometimes due to heavy rain at flowering stage inflorescence splash out. Professor Senapati suggested to apply plant growth hormone like Biovita @ 1-2ml per liter water or Miraculam 5-8ml per 15 liter water. Apply growth hormone two time once at now that is flowering stage and another at milk stage. Then he discussed about the difficulties faced in aman paddy cultivation. Sometimes in seed bed due to heavy rain water stagnation take place. If submergence stay in seed bed more than 7 days root or seedling rot takes place. Professor Senapati advised the farmers to apply Urea@ 250g per katha and 150g potash per katha.

Dr. Shibani Chowdhury First she introduce what is weather forecast and it's importance in agriculture. Then she introduced them with different weather App like *Meghdyut, mausam* and lightning alarming App *Damini*. She also delivered the number for WhatsApp group and clearly discuss how the farmers interact with the experts through WhatsApp group to solve their agriculture related problem. Then she discussed about the trend of changing climate and how farmers can modify their crop planning according to the changing climate.

Dr. Chowdhury gave emphasis to follow weather forecast before planning any farm operation, so that it help the farmers economically. She advised the farmers to follow proper process of fertilizer and pesticide application. Beside this she advised the farmers to observe the entire field regularly so that the disease attack can notice at early stage. As Coastal Saline region of West Bengal is very much extreme weather prone area so different level of forecast has a great importance for the farmers. She clearly discussed with them that how the long range and Extended range forecast helpful for the farmers before any natural calamities like cyclone, depression, Western Disturbance etc. She made a brief discussion how the farmers make decision regarding different farm management according to the short, medium, long range forecast and also the nowcast. Finally she said that weather cannot be changed but we can modify our agriculture pattern to minimize the adverse effect of weather.

Farmers' scientist interaction:

Farmers were very much interested about this programme . They demanded the type and exact dose of pesticide and fertilizer because only fertilizer and pesticide dealers guided them for such application. They also wanted to know why the pesticides don't give any effect in some cases. The Nodal Officer clearly discussed with them about the dose and process of mixing of pesticides with water. The effectiveness of any pesticide depends upon the right choice, proper dose and right time of application. They wanted to know effective pesticides of borer and sucking pest. Farmers were advised to use spinosad for borer pest and Imidachlorpit and Thiamithoxon for sucking pest. They also advised to use target pesticides like Spinosad pesticides.

Finally they requested us to arrange more number of meeting and field visit so that they can directly discussed about their problem with us.

REPORTS OF

FARMERS' AWARENESS PROGRAMME

26.02.24

Organized by
Agromet Field Unit, Kakdwip,
Bidhan Chandra KrishiViswavidyalaya

Sponsored by
India Meteorological Department, New Delhi

Venue:
Patharpratima block, Rakshaskhalir village, L-Plot Island, 24-Pgs(S),WB

Introduction:

The Farmers' Awareness Programme on climate, weather and crops was held at Rakshashkhali village, Patharpratima **Block**, 24-Pgs(S) on 03.01.24 as a half day programme. Around 60 farmers were attended the programme. The Rakshashkhali Village is situated near bay of Bengal , 42 km away from Regional Research Station, Kakdwip. The latitude of the location is N $21^0$46'32" and Longitude is E $88^0$25'42" with 54.1mt. Altitude. The main topic of this programme was the effect of high and low temperature crop cultivation mainly paddy cultivation. Beside this the contingency planning for extreme weather on crop cultivation, proper management practices in agriculture field and use of different weather related mobile App also highlighted in the meeting. The importance and application of block wise WhatsApp group also discussed here. The Nodal Officer Prof. A.K. Senapati, the technical officer, Dr. Shibani Chowdhury and the member of Gram Panchayet were present there in the programme.

As this area is naturally very much prone of abnormal weather event, it has a great beneficial importance to organize such programme among the farmers.

Prof. Senapati gave the brief introduction about Gramin Krishi Mausam Sewa , AMFU, Kakdwip. Farmers faced a lot of difficulties during boro season crop cultivation. Prof. Senapati discussed about the crops, nature of disease pest attack and also the remedy. Prevention before attack is more effortful than the application of pesticides after attack. In boro season when paddy seedlings are in nursery bed, special care is needed to survive them under uneven weather condition. Extreme low temperature, sudden rise of day temperature and morning fog is very harmful for paddy seedlings. Professor Senapati clearly discussed how the farmers take precaution against those unfavorable weather condition. Sometimes wrong selection of nursery bed area may cause root rot of young seedlings due to rotten mud and shade over the bed. First he advised the farmers to follow seed treatment before sowing. Seed treatment is the

only way to prevent the plants from blast. He gave some suggestion for getting healthy seedlings and preventing blast.

- Apply zinc EDTA 0.5g/liter of water for getting healthy seedlings
- Apply Di-Ethane M-45@2.5g/liter of water, SAF or Trycyclozole @ 6g per 10 liter of water (BIM or sivic) for blast attack. Before any spraying water should be drain out of from seed bed.
- Stirring the fog dew with bamboo stick so that the droplet cannot be deposit on the leaves.
- Where seeds were sowing in the field with rotten mud , root rot attack is found. Apply Gypsum or Zinc with potash fertilizer.
- Where seedlings are at 15-20 day old apply 300g urea, 300g DAP 200 SSP for 1 decimal area. After application of fertilizer water should be there for 48 hours.

Next Downey mildew attack of pulse and summer cucurbits is very harmful in boro season. This disease attack depends on weather condition. Foggy weather enhances this disease attack. Application of Diethane M-45@2.5g/liter of water or Chlrothalonyl@ 2ml/liter of water is very good remedy for downey mildew attack. Potato late blight is a very common and weather dependent disease. Cloudy weather with light rain enhance the infestation. Professor Senapati advised them to apply copper oxychloride 50% WP @ 4g per liter of water or Mancozeb 75% WP @ 2.5g per liter of water or Copper Hydroxide 77% WP @ 2.5g per liter of water before attack as a precaution measure. If plants found already infested, he advised them to spray 1-3 times a mixture of Metalaxyl 8%and Mancozeb 64% @3g per liter of water. Finally he said the importance of seed treatment for preventing late blight. More use of chemical fertilizer resulted fatigue of plants. Always apply target pesticide those are not harmful for another insect or plant parts.

Dr. Shibani Chowdhury first gave a brief lecture how the climate is changing year after year. A huge difference is found from the study of last 10 years weather parameter analysis. Then she introduced them with different weather App like *Meghdyut, mausam* and lightning alarming App *Damini* and discussed how the farmers can get weather forecast as well as crop advisories by using these Apps. She also dessiminated the

number for WhatsApp group and clearly discuss how the farmers interact with the experts through WhatsApp group to solve their agriculture related problem. It is essential to modify crop planning according to the trend of changing climate. Follow weather forecast before planning any farm operation is very important, it help the farmers economically. The effectiveness of any fertilizer depends upon its dose, time and way of application. She advised the farmers to follow these points carefully. Wrong process of fertilizer application and heavy use of fertilizer affect the plants health. Same as fertilizer application pesticide should be applied at proper time and dose also. Dr. Chowdhury suggested them not to apply any pesticide during morning to the crop with flowering stage as it hampers honey bee activity. She advised them to follow weather bulletin carefully before any spray. As Coastal Saline region of West Bengal is very much extreme weather prone area so different level of forecast has a great importance for the farmers. She suggested them to follow whatsapp group messeges before any natural calamities like cyclone, depression, Western Disturbance etc. Dr. Chowdhury suggested them to use more bio fertilizer and compound fertilizer instead of single chemical fertilizer. She suggested the farmers to follow community spraying for getting effective result against disease pest attack. Finally she said that it is a great challenge for us to cultivate crop under such changing climate but we can modify our agriculture pattern to minimize the adverse effect of weather.

Farmers' scientist interaction:

During the afternoon session an interaction was made with the farmers to address the issues experienced by them in day-to-day farm operations related to weather. Farmers were very much interested about this programme . As the area was very remote and no KPS or other Agricultural Expert even visited that village. They need the assistance for

proper use of fertilizer with proper dose. Proper guidelines for spraying is very important. Dr. Chowdhury suggested them to interact through WhatsApp group before spraying of any pesticide and also used more bio fertilizer in place of chemical fertilizer. Huge use of chemical fertilizer make the plants fatigued. Awareness of farmers for fertilizer application is very much necessary. Misguidance made by fertilizer and pesticide sellers resulted economic loss to the farmers. Dr. Chowdhury advised the farmers to follow the weather forecast and do the farm operation according to the forecast and advisory. Finally they requested us to arrange more number of meeting and field visit so that full information from them can be obtained on their needs for weather and climate information to improve future communication of weather and climate information to them to facilitate effective decision making on an operational perspective.

REPORTS OF

FARMERS' AWARENESS PROGRAMME

28.02.24

Organized by

Agromet Field Unit, Kakdwip,

Bidhan Chandra KrishiViswavidyalaya

Sponsored by

India Meteorological Department, New Delhi

Venue:

Sagar block, Komolpur village, L-Plot Island, 24-Pgs(S),WB

Introduction:

The Farmers' Awareness Programme on climate, weather and crops was held at Komolpur

village, Sagar **Block**, 24-Pgs(S) on 28.2.24 as a half day programme. Around 53 farmers were attended the programme. The Village is situated in the island. The distance of this location is around 54.1km from Regional Research Station, Kakdwip. The latitude of the location is N $21^0$46'32" and Longitude is E $88^0$25'42" with 54.1mt. Altitude. The main topic of this programme was the effect of frequent Western Disturbance and its effect on crop cultivation. Beside this the effect and contingency planning for extreme weather on crop cultivation, proper management practices in agriculture field and use of different weather related mobile App also highlighted in the meeting. The importance and application of block wise WhatsApp group also discussed here. The Nodal Officer Prof. A.K. Senapati, the technical officer, Dr. Shibani Chowdhury and the member of Gram Panchayet were present there in the programme.

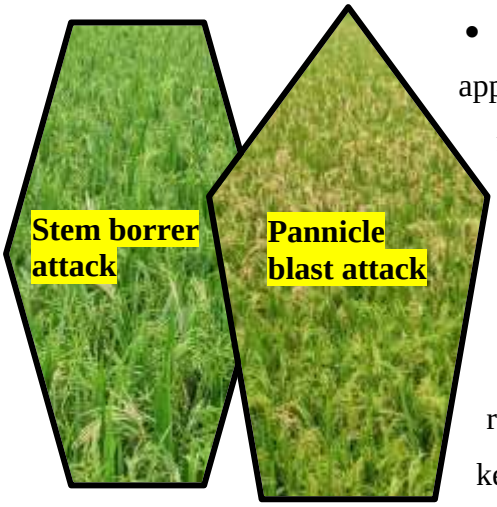
As this area is naturally very much prone of abnormal weather event, it has a great beneficial importance to organize such programme among the farmers.

Professor A.K. Senapati: **Prof. Senapati** gave the brief introduction about Gramin Krishi Mausam Sewa , AMFU, Kakdwip. Farmers faced a lot of difficulties at the end of boro season. It may be due to Norwester during harvesting time or heat wave during panicle initiation to f

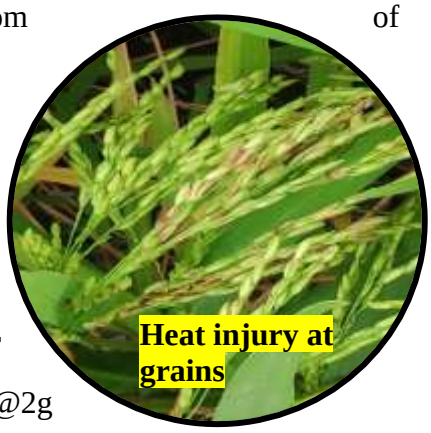
lowering stage. Prof. Senapati discussed the solution according to the requirements of farmers. The most harmful disease of boro paddy is fungal and bacterial blast attack throughout the growing period. Large day night temperature difference enhance blast attack. As the preventive method seed treatment Streptocyclene, Bavistin,

Diethane M-45 etc is very much effectful. For preventing blast attack apply a mixture of Streptocyclin @5g per liter of water and Tycyclozole@6g per liter of water from the base of plant for both bacterial and fungal blast attack. Prof. Senapati alert the farmers not to apply urea unnecessarily and avoid dense planting otherwise plants become more susceptible for blast attack.

From panicle initiation to grain filling, temperature and rainfall has an important role. Temperature fluctuation and sudden heavy rain may cause great yield loss. Under such abnormal weather condition Professor Senapati suggested some important advisories to minimize the harmful effect of abnormal weather.



- At panicle initiation stage just, before brusting of panicle apply one fungicide fungicide :trade name: Amister Top. After flowering restrict any spraying for 7 days, because movement inside the field with fully flowering stage hamper pollination which resulting chaffy grain
- At flowering stage if temperature rises more than 35^0C with hot air it prohibits cross pollination and as a result chaffy grain produced. He suggested the farmers to keep standing water during panicle initiation to milk stage and apply one spray of potash fertilizer before panicle initiation to increase the immunity.
- Extreme hot weather just after low temperature period caused neck blast which restrict the nutrient supply to the grain and the panicle with grain at milk stage and resulted chaffy grain. Prof. Senapati clearly discussed the symptom of node blast or neck blast. Standing water during panicle initiation to milk stage should be compulsory for preventing heat injury. Professor Senapati prescribed the farmers to apply compound fungicide Amister Top (Chemical composition : Azoxystrobin and Diphenoconazole) 1ml per liter of water and SAAF (Chemical composition : Mancozeb and Carbendazim) @2g per liter of water for panicle blast and node blast attack. Mix these two fungicide solution together in right composition and apply in clear weather condition.



- Heavy rain at flowering stage caused splash out of inflorescence. Professor Senapati suggested to apply plant growth hormone like Biovita @ 1-2ml per liter water or Miraculam 5-8ml per 15 liter water. Apply growth hormone two time once at now that is flowering stage and another at milk stage.

Dr. Shibani Chowdhury gave a brief discussion about the importance of weather forecast in agriculture. Then she introduced them with different weather App like *Meghdyut*, *mausam* and lightning alarming App *Damini*. She also delivered the number for WhatsApp group and how the farmers interact with the experts to solve their agriculture related problem. Then she discussed about the trend of changing climate and how farmers can modify their crop planning according to the changing climate. Dr. Chowdhury gave emphasis to follow weather forecast before planning any farm operation, so that it help the farmers economically. She advised the farmers to observe the entire field regularly so that the disease attack can notice at early stage. As Coastal Saline region of West Bengal is very much extreme weather prone area so different level of forecast has a great importance for the farmers. She clearly discussed with them that how the long range and Extended range forecast helpful for the farmers before any natural calamities like cyclone, depression, Western Disturbance etc. She made a brief discussion how the farmers make decision regarding different farm management according to the long range forecast and also the nowcast. Dr. Chowdhury suggested them to use more bio fertilizer to keep the soil health condition good. She suggested the farmers to spray on the crops as well as on the bunds for getting effective result against disease pest attack. Finally she said that weather cannot be changed but we can modify our agriculture pattern to minimize the adverse effect of weather

Farmers' scientist interaction:

Farmers were very much interested about this programme . They demanded the type and exact dose of pesticide and fertilizer because only fertilizer and pesticide dealers guided them for such

application. They also wanted to know why the pesticides don't give any effect in some cases. The Nodal Officer clearly discussed with them about the dose and process of mixing of pesticides with water. The effectiveness of any p esticide depends upon the right choice, proper dose and right time of application. They wanted to know effective pesticides of borer and 33 pest. Farmers were advised to use spinosad for borer pest and Imidachlorpit and Thiamithoxon for sucking pest. They also advised to use target pesticides like Spinosad pesticides.

Finally they requested us to arrange more number of meeting and field visit so that they can directly discussed about their problem with us.

REPORTS OF
FARMERS' AWARENESS PROGRAMME
10.03.24

Organized by
Agromet Field Unit, Kakdwip,
Bidhan Chandra KrishiViswavidyalaya

Sponsored by
India Meteorological Department, New Delhi

Venue:
Chandanpiri village, Namkhana block, 24-Pgs(S),WB

Introduction:

The Farmers' Awareness Programme on climate, weather and crops was held at Chandanpiri village, **Namkhana Block**, 24-Pgs(S) on 10.03.24. Around 53 farmers were attended the

programme. The main topic of this programme was the, effect of heat stress on field crop, horticulture crop and proper procedure of fertilizer and pesticide, fungicide application. Beside this different weather App like *Meghdoot*, *Damini* and importance of block wise WhatsApp group also highlighted here. The Nodal Officer Prof. A.K. Senapati, the technical officer, Dr. shibani Chowdhury, Agro-Met field observer, Mr. Biswajit Kar, of GKMS project and the members of Gram Panchayet were present there in the programme.

Prof. Senapati gave the brief introduction about Gramin Krishi Mausam Sewa , AMFU, Kakdwip. As the effect of global warming maximum temperature during April May showed an increasing trend , Professor Senapati discussed clearly how the farmers can save their crop from extreme hot condition. In April month boro paddy is in milk stage to grain filling stage. Extreme high temperature caused chaffy grain production. Professor Senapati gave a brief discussion about the preventive method against extreme high temperature.

- At flowering stage if temperature rises more than 35^0C with hot air it prohibits cross pollination and as a result chaffy grain produced. He suggested the farmers to keep standing water during panicle initiation to milk stage and apply one spray of potash fertilizer before panicle initiation to increase the immunity.

- Extreme hot weather just after low temperature period caused neck blast which restrict the nutrient supply to the grain and the panicle with grain at milk stage and resulted chaffy grain. Prof. Senapati clearly discussed the symptom of node blast or neck blast. Standing water during panicle initiation to milk stage should be compulsory for fungicide Amister Top (Chemical composition : Azoxystrobin and Diphenoconazole) 1ml per liter of water and SAAF (Chemical composition : Mancozeb and Carbendazim) @2g per liter of water for

panicle blast and node blast attack. Mix these two fungicide solution together in right composition and apply in clear weather condition.

- Start harvesting at 80% maturity stage and use combined harvestor to complete harvesting quickly for preventing shattering due to the effect of extreme heatwave
- Lifesaving irrigation must be given at evening hours for summer cucurbits.
- For preventing tender fruit dropping of mango and fruit cracking of litchi apply water throughout the whole plant (from base to leaves).

Dr. Shibani Chowdhury gave a brief discussion about the climate change and how it affects on crop. Extreme high and low temperature and extreme heavy rain both are very harmful for crop cultivation. She said the that weather is the most important factor for crop cultivation at any region. Types of crop cultivation first depend on climate then soil. In coastal region of West Bengal paddy is the most important crop. She described how the weather parameters affect the phonological stages of paddy. Pre-monsoon shower and progress of monsoon is very important for aman paddy cultivation from sowing to maturity. Similarly temperature variation has a great importance in boro paddy cultivation. Attack and progress of disease pest infestation depends upon weather. So, preventive method based on weather forecast is much more beneficial for the farmers to minimize crop yield. Then she introduced them with different weather App like *Meghdyut, mausam* and lightning alarming App *Damini* and how they use those App to get weather forecast. She also dessiminated the number and usefulness of WhatsApp Dr. Chowdhury gave emphasis to follow weather forecast before planning any farm operation, so that it help the farmers economically. As Coastal Saline region of West Bengal is very much extreme weather prone area so different level of forecast has a great importance for the farmers. Finally she said that weather cannot be changed but we can modify our agriculture pattern to minimize the adverse effect of weather.

Farmers' scientist interaction:

During the afternoon session an interaction was made with the farmers to address the issues experienced by them in day-to-day farm operations related to weather. Farmers were very much interested about this programme . As the area was very remote and no KPS or other Agricultural Expert even visited that village. They need the assistance for proper use of fertilizer with proper dose. Proper guidelines for spraying is very important. Dr. Chowdhury suggested them to interact through WhatsApp group before spraying of any pesticide and also used more bio fertilizer in place of chemical fertilizer. Huge use of chemical fertilizer make the plants fatigued. Awareness of farmers for fertilizer application is very much necessary. Misguidance made by fertilizer and pesticide sellers resulted economic loss to the farmers. Dr. Chowdhury advised the farmers to follow the weather forecast and do the farm operation according to the forecast and advisory. Finally they requested us to arrange more number of meeting and field visit so that full information from them can be obtained on their needs for weather and climate information to improve future communication of weather and climate information to them to facilitate effective decision making on an operational perspective.

KRISHI MELA 2024 , 15TH AND 16TH FEBRUARY

PLACE: BIDHAN CHANDRA KRISHI VISWAVIDYALAYA

MOHANPUR, NADIA

A krishi mela was held on Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia on 15th and 16th February, 2024. More than 1000 farmers from all over West Bengal attended that Krishi Mela. Different agricultural products and all type of

crops were displayed and sold in that Krishi Mela. Beside this a huge discussion was held with the farmers came from different district of West Bengal and Agriculture experts from different stream in the programme. In

order to disseminate usefulness of Gramin Krishi Mausam Sewa , different weather App like Meghddot , Damini among the farmers, several interviews were arranged by different News Channel with the Nodal and Technical Officer of GKMS, AMFU, Kakdwip.

INTERNATIONAL CONFERENCE ON "CLIMATE CHANGE AND AGROECOSYSTEM: THREATS, OPPORTUNITIES AND SOLUTIONS" (INAGMET-2024) 8TH TO 10TH FEBRUARY, 2024

PLACE: VENARAS HINDU UNIVERSITY

Technical officer of Gramin Krishi Mausam Sewa, AMFU, Kakdwip Dr. Shibani Chowdhury attended an International Conference on "Climate Change and Agroecosystem: Threats, Opportunities and Solutions" (INAGMET-2024) from 8th to 10th February, 2024. The Conference was jointly Organized by Association of Agrometeorologists, at Banaras Hindu University. The topic of the presentation was **Impact assessment of Weather Based Agro Advisory Services in Coastal Saline Zone of West Bengal. The paper was presented by Technical Officer, Dr. Shibani Chowdhury.**

Technical officer of Gramin Krishi Mausam Sewa, AMFU, Kakdwip Dr. Shibani Chowdhury attended a programme at All India Radio on World Meteorological Day . The main topic of this programme was the effect of changing climate on Agriculture and how crop planning and contingent planning can minimize the adverse effect of adverse weather condition. Beside this Dr. Shibani Chowdhury discussed the importance of weather forecast and usefulness of different weather App in Agriculture.

ANNEXTURE-5

Research and Development

Impact of high day temperature on the panicle blast infestation of boro paddy from 2021 to 2024

Rice blast is one of the most important diseases of rice, caused by a fungus *Magnoporthe oryzae* . The pathogen may infect all the aboveground parts of a rice plant at different growth stages: leaf, collar, node, internode, base, or neck, and other parts of the panicle, and sometimes the leaf sheath.

Leaf blast: An infected leaf has diamond- shaped or elliptical or spindle- shaped spots with gray or white centers and brown margins. The spots may merge leading to a complete drying of the infected leaf.

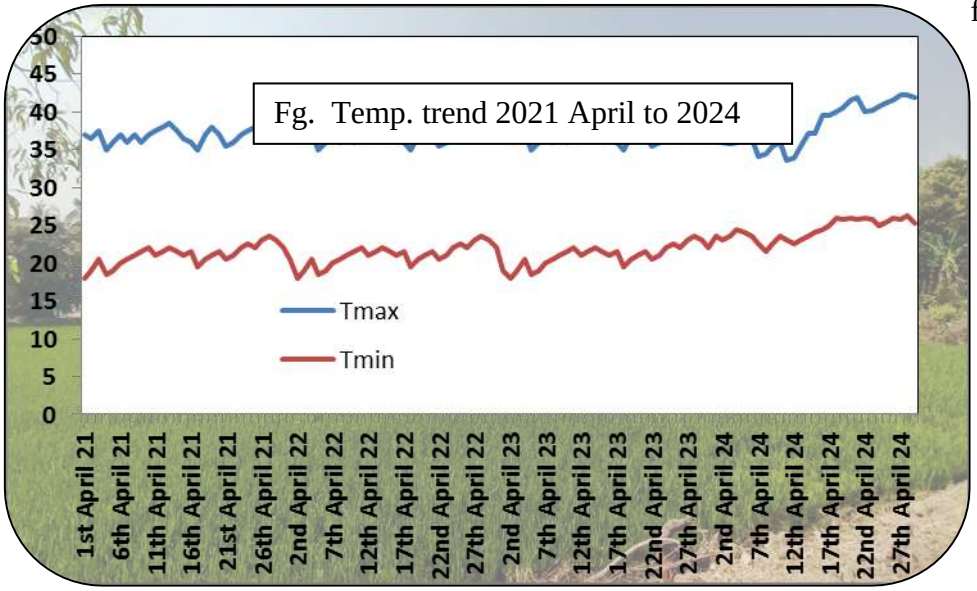
Collar blast: Lesion is located at the junction of the leaf blade and leaf sheath and can kill the entire leaf.

Node blast: The infected node rots causing all above parts to die.

Panicle blast: The infected panicle turns white and dies before being filled with grain.

Neck blast: Symptoms appear at the base of the panicle. Infected panicles appear white and are partly or completely unfilled. The whitehead symptoms can easily be confused with a stem borer attack which also results in a white and dead panicle.

Rice blast is present wherever rice is cultivated and occurs with varying intensities depending on climate and cropping systems. Large day and night temperature difference with high humidity is favourable for seedling blast and leaf blast. During milk stage of boro paddy if day temperature rise more than 35^0C with hot air, it prohibits cross pollination and as a result chaffy grain produced. Extreme hot weather just after low temperature period caused node blast or neck blast which restrict the nutrient supply to the grain and the panicle with grain at milk stage turned into white with blackish colour



Fg. Temp. trend 2021 April to 2024

at the base of pannicle. The symptom of node blast or neck blast, that is at the base of panicle , 1 to 2inch area brownish and flag leaf turn whitish. Symptoms look like stem borer attack but the panicle canot be easily pulled up.

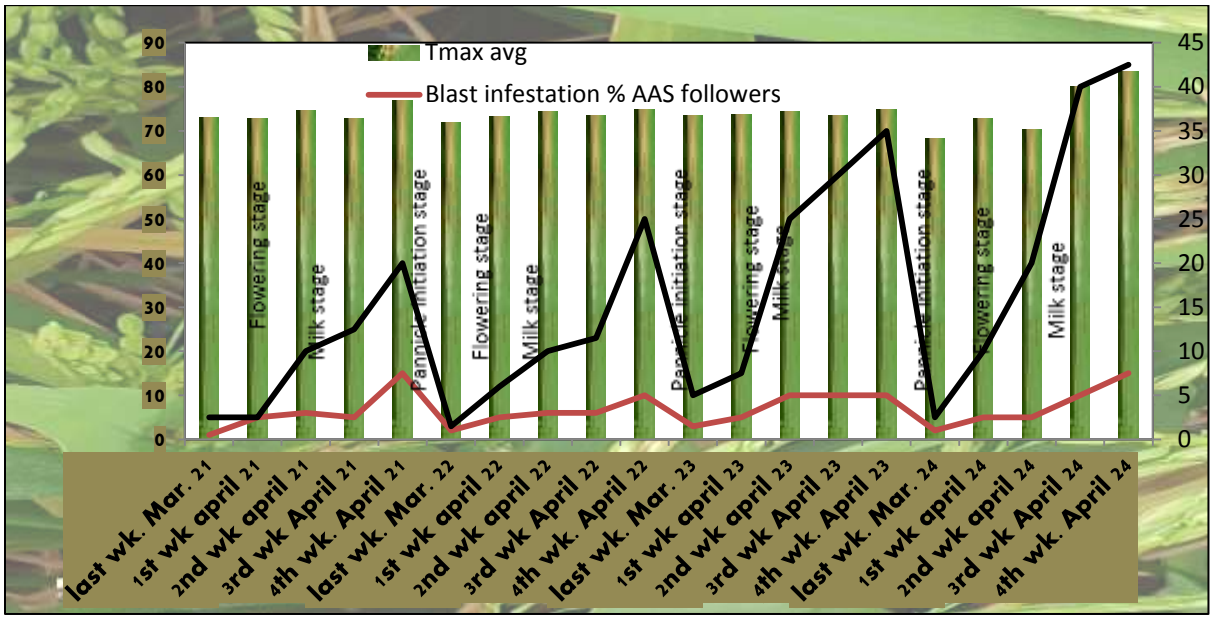


Fig: Avg. temp. VS blast infestation of AAS followers and non followers

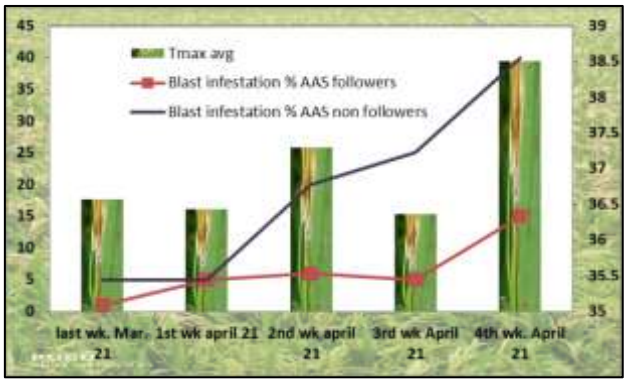


Fig: Avg. temp. VS blast infestation of AAS followers and non followers (2021)

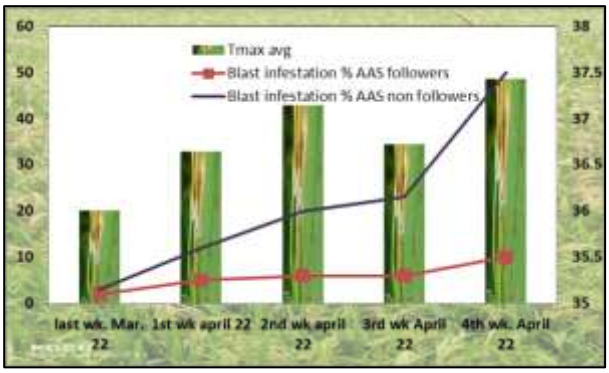


Fig: Avg. temp. VS blast infestation of AAS followers and non followers (2022)

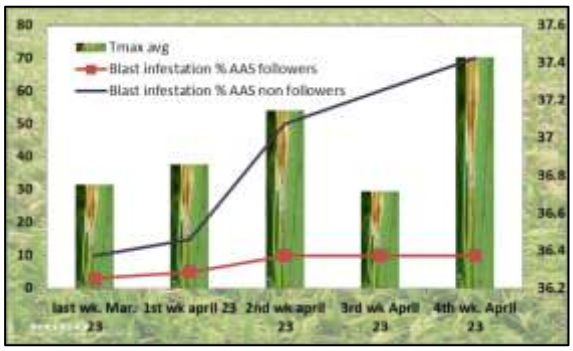


Fig: Avg. temp. VS blast infestation of AAS followers and non followers (2023)

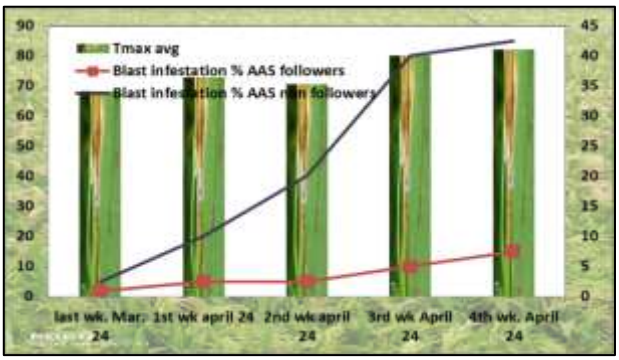


Fig: Avg. temp. VS blast infestation of AAS followers and non followers (2024)

A survey was made in Sagardwip island of South 24 Parganas to study the impact of increasing day temperature on panicle blast disease at milk stage of boro paddy from 2021 to 2024. From the study it was found that in 2022, increasing day temperature up to 40^0C enhanced panicle blast infestation. The rate of infestation is showing an increasing trend from 2022 to 2024. As the range of day temperature increased from 39^0C to 42^0C the infestation become more severe. A comparison was made among the weather based Agro Advisory follower farmers and non follower farmers. It was found that where farmers applied compound fungicide Amister Top (Chemical composition : Azoxystrobin and Diphenoconazole) 1ml per liter of water and SAAF (Chemical composition : Mancozeb and Carbendazim) @2g per liter of water At panicle initiation stage just, before brusting of panicle and after flowering restrict any spraying for 7 days as per the Agro Advisory, the fields were very little affected by Pannicle blast. Huge infestation was noticed where the farmers did not follow the weather based agro advisories. From 2022 an increasing temperature trend is found in April when paddy is in milk stage. High day temperature around 38^0C to $>40^0$C with dry hot wind prohibit pollination and lower part of panicle produce chaffy grain. From March to April sudden rise of

temperature caused panicle blast attack and due to fungal growth at the base of panicle nutrient supply to the grain prohibit and resulted chaffy grain. Precaution should be taken at panicle initiation stage during the last week of March. After application of fungicide restrict any spraying or movement inside the field to keep an undisturbed environment from flowering to pollination Water level should be maintain upto milk stage to keep cool inside the field which is required for pollination. Huge urea application and close spacing enhance panicle blast infestation.

ANNEXTURE-6

Dissemination of AAS bulletin,

Dissemination of AAS bulletin and whats-App group

GKMS, AMFU Kakdwip provide AAS bulletin bi-lingual and biweekly (Tuesday and Friday) on the basis of forecast data received from RMC, Kolkata and disseminate to KVK, KCC, ATMA and 28 numbers of B.D.O of the district South 24 Parganas and 47 bers of B.D.O. of the district Purba Medinipur. The bulletin made in Agro DSS Portal and upload the District and block level bulletin in IMD Webcite. Besides this including weekly advisories , GKMS , AMFU, Kakdwip provide nowcast for heavy rainfall or thunderstorm ,cyclone alert and crop specific advisories according to the farmers demand through blockwise whatsApp group. The total number of bulletin disseminated by AMFU, Kakdwip in the year 2023-24 was more than 100. We also introduced the farmers with "*Meghdoot"* and "*Damini"* App and the use of those App. Several numbers of field visits and farmers meet with farmers during abnormal weather condition according to the season ,were done in order to keep direct contact with farmers to help them for solving their problem. The WhatsApp group was already made with the smart phone user farmers of different blocks and they want suggestion for their crop cultivation as well as weather forecasting through the WhatsApp group. We send them particular advisory and forecast of thunderstorm, heavy rainfall, clear sky, high or low temperature, Norwester etc. throughwhatsApp messages. We also keep in touch with the demand from farmers through the field visit and also collect the feedback from the farmers.

ANNEXTURE-7

Status of observatory ,Farmer's demand and constraints

9.1 Status of Observatory : Conventional

Date of Installation	01.01.17
Parameters measure	Maximum & minimum Temperature, Rainfall, relative humidity, pan evaporation, Soil temperature at different 3 depth (5cm, 1ocm and 15cm), wind speed, wind run, wind direction and grass minimum temperature,
Instrument details:	All the instruments are IMD specified Namely • Maximum and minimum thermometer • Dry and wet bulb thermometer • Ordinary Rainguage (immediately need to change) • Pan Evaporimeter, • Soil thermometer, • Grass minimum thermometer (Non functional) • Anemometer, (Non-functional) • wind vane, • Sunshine recorder (non-functional)

9. 2 Farmer's demand from AAS bulletin

1. Proper guide line for fertilizer application with measurement.
2. Availability for soil testing to know the soil health before micronutrient apply.
3. Quick suggestion for disease pest attack.
4. Timely forecasting of rainfall, storm and hail storm for their farm operation like irrigation, harvesting, spraying etc.
5. Suggestion of improved seed variety including the source so that they can purchase it.
6. To learn modern agricultural technologies for their crop cultivation.
7. Integrated pest & disease management.

9.3. Constraints

- Delay in disseminating AAS bulletin due to poor internet network and power failure.
- Lack of smart phone users.
- Less amount of fund for Farmer Awareness Programme.

Summary

Weather based Agro Advisory Service under Gramin Krishi Mausam Sewa, IMD, Govt. of India at AMFU, Kakdwip has a great importance for the agriculture sector in Coastal Zone of West Bengal. Farmers got benefitted though the bulletin , blockwise WhatsApp group, farmers meet, field visit and awareness programme. One of the major problem, the farmers faced to diagnose the symptom whether it is due to disease or pest or nutrient deficiency. Through WhatsApp group they easily diagnose the symptom and on the basis of this they applied medicine. Beside this, more urea application enhance the chance of disease pest attack. So fertilizer application in proper way has a great importance. Another important point is that, preventive measure is much beneficial than pesticide application. Through WhatsApp group farmers can interact directly with the expert and get advice according to their problem. Awareness programme, field visit, farmers meet organize by AMFU, Kakdwip in remote area of Sundarban region help the farmers to interact with the experts and share their technical knowledge.