



Utilization of Agromet Advisory Bulletin for Enhancing Crop Yield of Paddy under Different Micro-Climatic Regimes

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ABSTRACT

The Agromet Advisory bulletin was effectively used in the farming community and farmers got higher yield. Frontline demonstrations were conducted on climate resilient paddy variety *Swarna sub -1* under three different microclimatic during *kharif* 2020-21 in Cachar district. Due to the timely receiving of weather forecast and agromet advisory bulletin, the farmers could save the crop damages from the flood during *kharif* 2020-21. Three different microclimatic regimes (MR) viz. 15th June, 25th June and 5th July, 2020-21 were selected for assessment of crop weather relationships. Results showed that the crop sown on 25th June gave higher yield as compared to the first and third sowing dates during *kharif* 2020-21.

Key Words: Advisory, Agromet, Bulletin, Paddy, Yield.

INTRODUCTION

The success and failure of crops in the large parts of the country depend on the monsoon rain. There are numerous and diverse sources of weather and climate-related risks in agriculture; limited water resources, drought, land degradation, erosion, hail, flooding, early frosts and many more. The losses in the crop can be reduced by doing proper crop management in time by timely and accurate weather forecasts. Agro meteorological advisories are the single window solutions for all the queries related to fluctuating weather conditions and management of crops, livestock, and fishery according to that. Weather forecast also provides guidelines for the selection of crops best suited to the anticipated climatic conditions. How to minimize the crop losses though weather forecast of different extreme events (like Cyclones, flood and hailstorm) during the crop growing season, India Meteorological Department (IMD) is rendering district level weather-based agrometeorological advisory service named as Gramin Krishi MausamSewa since 2008

in the country to cope up with weather and climatic risks and uncertainties. Agromet Advisory Services are the provision of accurate and locally appropriate climate and weather information play a vital on risk mitigation in agriculture.

Rice is the major crop of Cachar district as well as for the whole state of Assam. Cachar district is come under low lying flood prone areas. Flood is the main extreme event during *kharif* season, causing wide extends of damage to paddy crop. Recurrent flood is the major problem confronting the area in general and farmer in particular. To overcome this problem, a demonstration was carried out through effective using of Agromet advisory bulletin on climate resilient paddy variety i.e., *Swarna sub -1* in the low lying flood prone villages of Cachar district. As we know that the climate resilient variety i.e. *Swarna sub -1* can survive up to 14 days under submerge condition. During the crop growing period, weather forecast and advisories were provides each and every phases. The demonstration was carried out in the three different microclimatic regimes to

know the impact of major weather parameters and variation of yield attributes.

MATERIALS AND METHODS

A Frontline Demonstration (FLD) programme was conducted on Climate resilient paddy variety i.e. *Swarna sub -1* to know the impact of weather and climate through weather forecast and agromet advisory bulletin during 2020-21. The demonstrations were conducted into the two different villages. The three different microclimatic regimes (MR) or sowing date viz. 15th June, 25th June and 5th July were selected for assessment of crop weather relationships. Which sowing date gives higher yield performances and which weather parameters have more impact during different crop phenophases that has been evaluated. Weather forecast of rainfall and other parameters are very much important in these low lying flood prone areas. Before District Agrometeorological Unit (DAMU) of KVK Cachar, the farmers of NICRA villages and adjoining village's do not have the sufficient knowledge about the weather forecast and agromet advisory bulletin. From 2019, farmers were benefitted from this Agromet Advisory Services (AAS). Keeping this point, farmers of villages were advised to sow the climate resilient paddy variety in the low land areas. The above mentioned sowing dates were selected for estimate the yield performance of *Swarna sub -1* variety in each phenophases. The predicted weather forecast and advisories are given to the farmers of NICRA villages and other progressive farmers over phone, by physically meeting and also through SMS. Important weather warnings were disseminated to the NICRA villages during each and every crop phenophases. Once the farmers received the forecast and agro advisory, they can plan and take decisions accordingly. Different intercultural operations and precautionary measures were provided during crop growing period through agromet advisory bulletin. The major weather parameters were recorded from

India Meteorological Department during crop growing period for analysis of thermal indices. The following thermal indices were calculated as:

Growing degree-days (GDD)

A summation of positive temperatures above a base temperature or "zero point of vital activity" is the working basis for most heat unit systems. A degree-day, or a heat unit, is the departure of the mean daily temperature above the minimum threshold (base) temperature. This minimum threshold (T_{base}) is the temperature below which no growth takes place.

Heat use efficiency (HUE) = Seed yield or Total dry matter/Accumulated heat units ($^{\circ}\text{C day}$)

Statistical analysis

Pearson correlation coefficient of grain yield and accumulated agroclimatic indices and different phenological stages were carried out by SPSS 20 software, Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Agro-climatic indices in relation to crop phenology, growth and yield

During sowing to transplanting (SW-TP) phase, the highest Accumulated growing degree-days (AGDD) was found in 15th June 2020 sown crop (MR-I) followed by 25th June 2020 (MR-II) and 5th July 2020 (MR-III) sown crop irrespective of varieties (Table 1). But in both the transplanting to tillering (TP-TL) phase and tillering to 50% flowering (TL-50%) the highest Accumulated growing degree-days was found in 25th June 2020 sown crop (MR-II) and same trend was observed for the Accumulated heliothermal units (AHTU) in 25th June 2020 sown crop (MR-II).

On the other hand, in 50% flowering to physiological maturity phase, highest AGDD was found in MR-II than MR-I and MR-II and same trend was recorded for the Accumulated heliothermal units (AHTU) (Table 1).

Table 1. Agro climatic indices in relation to crop phenology during *kharif* 2020-21.

	DAYS	AGDD	AHTU
MR-I			
SW-TP	33	645	2199
TP-TL	34	676	1692
TL-50% FW	63	1226	2085
50% FW-PM	22	446	2826
Total	152	2994	8802
MR-II			
SW-TP	28	536	1390
TP-TL	35	702	1897
TL-50% FW	63	1231	2438
50% FW-PM	29	460	2932
Total	155	2928	8657
MR-III			
SW-TP	27	520	1240
TP-TL	30	627	1638
TL-50% FW	67	1207	3260
50% FW-PM	32	424	2590
Total	156	2778	8728

MR-I, MR-II & MR-III:-Microclimatic regimes/ Sowing dates; AGDD:-Accumulated growing degree-days; AHTU:- Accumulated heliothermal units ; SW-TP:-Sowing to transplanting; TP-TL:-Transplanting to tillering; TL-50% FW:-Tillering to flowering; 50% FW-PM:-Flowering to physiological maturity.

Heat use efficiency of three different microclimatic regimes

It was evident from the fig 2 that among the three micro-climatic regimes, the highest TUE (2.56 kg/ha/°C-day) was observed in 25th June 2020 sown crop (MR-II)

During the crop growing period *kharif* 2020-21, the different phenological stages viz. number of effective tillers/hill, plant height& length of panicle, the highest value was recorded in the 25th June 2020 sown crop (MR-II) and lowest value was found in the 5th July 2020 sown crop (MR-III) (Table 2).

The highest grain yield (65 q/ha) value was found in the crop sown on 25th June 2020 (MR-II) and lowest value was observed in the 5th July 2020 sown crop (MR-III). And same trend was recorded in case of B:C ratio also.

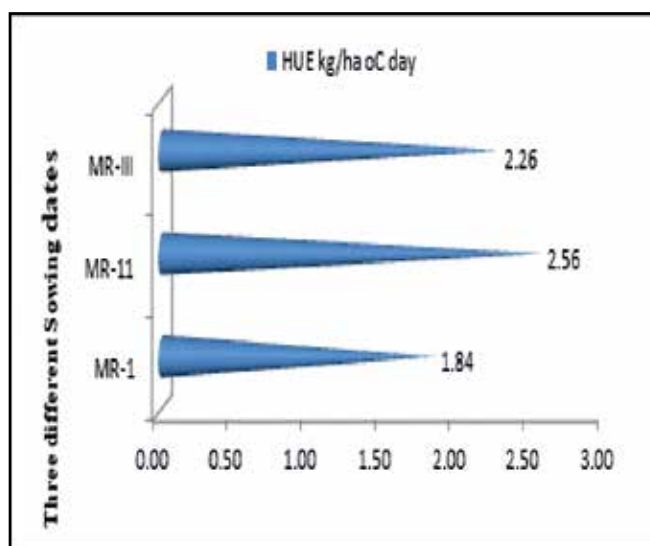


Fig 2. Heat use efficiency (kg/ha/Unit) in *Swarna sub-1* during *kharif* 2020-21 .and the lowest vale was observed during the 5th July 2020 sown crop (MR-III).

Table2. Yield attributes of *Swarna sub-1* of three different microclimatic regimes/sowing dates during kharif 2019-20 & 2020-21:

Var-Swarna sub-1	MR-1	MR-11	MR-III	MR-II (25 th June)
	<i>Kharif 2020-21 (After DAMU)</i>			<i>Kharif 2019-20 (Before DAMU)</i>
No of effective tillers/hill	9.5	10.2	9.3	9.1
Plant height	96.9	108.8	95.4	102.4
Length of panicle	26	32	25	29
grain/panicle	221	232	209	224
Days maturity	152	155	156	157
Grain yield (q/ha)	55	65	50	53
B:C ratio	2.2	2.8	1.7	1.9

Correlation between grain yield and accumulated agro-climatic indices & different crop phenophases of *Swarna sub-1* during kharif 2020-21:

Correlation coefficients, of grain yield and different accumulated agro-climatic indices & different phenophases were computed. The results are presented in Table 3. Most of the correlation coefficients corresponding to different phases viz., number of effective tillers/hill, plant height, length of panicle, grain/panicle, days maturity and accumulated agroclimatic indices like AGDD & AHTU were found to be statistically significant at 1% level during *kharif* 2020 (Table 3).

The salient feature observed was that most of the crop phenophases and agro-climatic indices barring a few, yielded correlation coefficients greater than 0.800 in respect of the plant height, length of panicle, grain/panicle, days maturity. And negative correlation was found in the accumulated helio thermal unit.

CONCLUSION

Flood and hail storm were the main extreme event during both the pre monsoon and monsoon seasons. Higher mean temperatures during earlier date's *i.e* optimum sowing time sown crop (MR-II) gave higher seed yield and other yield components. Crops sown on earlier dates accumulated higher

degree-days in shorter time due to relatively higher ambient temperatures. I was concluded that, all the accumulated agro climatic indices were highest in crop sown in early dates (25th June) as compared to both 15th June & 5th July. And when we compare the yield attributes of *Swarna sub-1* before DAMU (2019-20) and after DAMU (2020-21), the highest crop yield was found during *kharif* 2020-21 *i.e* after establishment of DAMU. This yield gap was happened due to use of agromet advisory bulletin. This weather forecast advisories are very effectively use by the farmers of villages and could save the crop damages from the any extreme weather event and their income generation also increases.

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Table 3. Correlation coefficient between accumulated agro climatic indices at maturity, yield attributes and grain yield.

Sr. No	Traits	Correlation with grain yield
1	Numbers of effective tillers /hill	0.590
2	Plant height	0.819**
3	Length of panicle	0.729*
4	Grain/panicle	0.986**
5	Days maturity	0.901**
6	AGDD	0.628
7	AHTU	-0.314

** Correlation was significant at the 0.01 level; * Correlation was significant at the 0.05 level; AGDD:- Accumulated growing degree days; AHTU:-Accumulated heliothermal unit

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