PLANT PHYSIOLOGY

6. PLANT PHYSIOLOGY

CONTENTS

6. Plant Physiology

Summary

Physiological studies under All India Co-ordinated Rice Improvement Program were conducted at eight funded centres, (Coimbatore, Maruteru, Pantnagar, Pattambi, Rewa, Raipur, Karjat and Titabar), two ICAR institutions (IIRR Hyderabad and NRRI Cuttack) and six voluntary centres (RARS Chinsurah, NDUAT Faizabad, PJNAR Karaikal, RARS Karjat, IGKV RAIPUR and BAU Ranchi). The trials conducted during 2019 are given as below.

Star Chart of Plant Physiology Coordinated Studies for the Year Kharif 2019

Locations	Trials						Allotted	Conducted	Conducted (%)	Not conducted	Grand Total
	Silicon	Heat Tolerance	RFU	MAS	SUB	LLS					
CHN	√	√	-	-	-	-	2	2	100	-	2
CBT	√	-	√	√	√	-	4	4	100	-	4
NRRI	√	√	√	√	√	√	6	6	100	-	6
IIRR	√	√	-	-		√	3	3	100	-	3
FZB	-	-	-	√	√	-	2	2	100	-	2
KJT	√	-	-	√	-	√	3	3	100	-	3
KRK	√	-	-	√	-	-	2	2	100	-	2
MTU	√	√	-	√	-	√	4	4	100	-	4
PNR	√	√	-	√	-	√	4	4	100	-	4
PTB	√	√	√	√	√	-	5	5	100	-	5
REWA	√	√	√	√	-	-	4	4	100	-	4
TTB	√	√	√	√	√	√	6	6	100	-	6
RPUR	-	-	√	-	-	√	2	2	100	-	2
RANCHI	√	-	√	√	-	-	3	2	75	1	2
Total	**12**	**8**	**7**	**11**	**5**	**7**	**50**	**49**		**1**	**49**

The salient findings of the experimental research are presented below:

6.1. Influence of silicon on induced stress tolerance in rice genotypes

In view of the importance of silica in rice nutrition, a trial was conducted at different AICRIP locations spread across the country. The experimental lay-out was split-plot with three replications. The treatments include T1 = Control (water spray), T2 =0.8% Silicon, T3 = Water stress T4 =. Silicon + water stress, Water stress was imposed after PI stage by withholding irrigation. The results revealed that application of silicon (T2) resulted in >11% increase in mean grain yield(mean of all varieties & locations) . The increase in grain yield is maximum at REWA (>17% in crease over control) followed by KJT and NRRI (<12% increase). Similarly, imposition of WS (T3) caused significant reduction in yield and the extent of reduction varied from location to location. Maximum reduction in GY was observed at PTB followed by TTB and REWA. Imposition of water stress (T3) resulted in >10%

reduction in mean grain yield. Maximum reduction in GY was observed at PTB followed by TTB and REWA The mean GY (mean of all locations) varied between 566 g/m^2 (IRRH-132) to 480 g/m^2 (Sahabhagidhan). Application of Silicon showed maximum effect in JKRH-3333 followed by IIRRH-122. Imposition of water stress show maximum effect on HRI-174 followed by IRRH-132 and KRH-4. Application Silicon on water stressed plants resulted in maximum mitigation of yield reduction caused by water stress in Sahabhagidhan followed by IIRRH-131.

6.2 Screening of elite rice cultures for drought tolerance:

A trial was conducted 30 rice genotypes taken from *IVT-E-DS* trial and 5 released varieties during Kharif-2019 at 5 locations and during Rabi-2018-19 season at TTB where in 22 AVT entries and 8 released varieties were tested for drought tolerance. Treatments consists of total rainfed condition without any supplementary irrigation and another with recommended irrigation. Based on the reduction in grain yield under rainfed condition IET 28250, IET 28262, IET 28262, IET 28660 and US 314 could be identified as relatively drought tolerant and these entries are suitable for rainfed cultivation. Based on drought indices computed, IET 28252, IET 28256, IET 28245, Sahabhagidhan and US-314 have high Mean Rank with low SEm and they may be considered as relatively drought tolerant and are suitable for rain fed cultivation. Stability analysis indicated Based on stability analysis IET 28243, Sahabhagidhan, IET 28246, IET 28247, IET 28249, IET 282 51, IET 280 52, IET 28254, Tulsi, IET 28255, 28256, US314, IET 28260 and IET 28262 can be selected as stable genotypes which performed well across the locations. At TTB the trial was conducted during Rabi season. Based on the reduction in yield under rainfed condition IET 27519, Vandana and Govind can be identified as drought tolerant varieties. Various drought tolerance indices were computed and based on high mean rank and low SEm the genotypes IET 27514, IET27522, Govind, IET 27520, 27525, 27519 and Sammaleswari could be identified as relatively drought tolerant and suitable for rain fed conditions.

6.3 Screening for high temperature tolerance in rice genotypes.

Covering the field grown crop with polythene supported by metal frame immediately after PI stage had resulted in an increase in temperature inside the tunnel. The increase in temperature is <4.0 C at most of the centres with an exception at IIRR, PTB and PNR where the temperature difference is >8.0 C. The results show all the tested genotypes suffered

substantial yield loss under high temperature condition. None of the tested entries performed better than the tolerant check N-22 (>17% reduction over control) in terms of grain yield. Only IET26780 with 19.5% reduction and IET28403 (>25% reduction over control) showed any tolerance to high temperature. These entries may be considered as moderately tolerant. The grain yield recorded under elevated temperature showed strong association with GMP, YI, MP, K2STI and HIS and these indices are useful in screening for high temperature tolerance. The genotypes were ranked for each index and rank-sum and mean rank for each genotype was calculated. The genotype with high mean rank and low SEm± was considered as heat tolerant genotype. Based on the mean rank IET28387, IET28390, IET28393, IET28397, IET28403, Gontra bidhan-3 and IET28432 performed better than the tolerant check N-22. These entries may be considered as relatively heat tolerant. Stability analysis was performed to identify genotypes which produced high yield and high stability. Based on stability variance and stability rating IET 28386, 28387,28390, 27668, 28393, 28397, 28400, 28403, Gontra bidhan-3, IET28408, 28409, 28511, 28422, 28425, 27908 and IET25713 performed well and are selected as genotypes with high yield . However, in IET 28407 and IET27876 show non-significant stability variance (σ_i^2) .

6.4 Physiological characterization of selected rice genotypes for multiple abiotic stress Tolerance

Screening for multiple abiotic stress tolerance was conducted at 11 AICRIP centres for salinity, water stress (1% and 2%) and anaerobic stress. Germination % under saline conditions is one of the important criteria for screening for salinity tolerance. Based on their performance under salinity stress, IET 27762, IET 26861, Mahulata, IET 27768, Rashpanjor and IET 27768 performed well and may be considered as relatively tolerant genotypes. The entries IET 27750 , IET 27762, Parijat, IET 27768, IET 26861 and IET 27356 performed well under moderate water stress (1% mannitol) where as under 2% mannitol induced stress, Mahulata, IET 27768, BVD 109, IET 27762 IET 27750, Brahman-Nakhi), IET 27758 and IET 27757 can be identified as relatively tolerant. Under anaerobic stress, all the tested entries suffered reduction in important physiological trait. However, IET 27768, Rashpanjor, Mahulata, and IET 27356 could be identified as relatively suitable for anaerobic conditions. Entries like IET 27762 show tolerance to salinity and water stress, IET 27768 and Mahulata performed well under salinity, water stress and anaerobic stress, IET 27356 show relative

tolerance to water stress and anaerobic stress. These entries could be identified as possessing tolerance to multiple abiotic stresses.

6.5. Screening for submergence tolerance in Rice

During Kharif 2019, a trial was formulated to evaluate promising rice genotypes for submergence tolerance. Seventeen different rice genotypes were included in the trial which was conducted at four AICRIP centres (NRRI, PTB, FZ B and TTB). Submergence tolerance was estimated by survival percentage of the seedlings subjected to complete submergence. The survival percentage was relatively higher in AC42088 Sabita followed by AC38575, AC42088 and Madhulata, these show better survival percentage than the Swarna sub1 at TTB centre. Similarly, at NRRI AC42088 show maximum survival percentage (98%) followed by Sabita (61%) Swarna Sub-1 (61%) andIC516009 (<58%). As many as 7 genotypes did not survived the submergence treatment. Significant differences were noticed in starch content among the genotypes. A significant positive association was observed between the leaf starch content and % survival indicating that leaf starch content is very important in seedling survival during submergence.

6.6 Screening of elite rice germplasm for low light stress tolerance

A trial was conducted at 7 AICRIP centres with 18 genotypes including 16 taken from IVT-SDW trial. Swarnaprabha was included as tolerant check and IR-8 was taken as susceptible check. Low light treatments were imposed immediately after transplanting by enclosing the plots in shade-net (50% transmittance). The shade net was supported by metal/bamboo poles. Low-light stress did not significantly influence the days to flowering and days to maturity. Significant increase in leaf chlorophyll content was observed in all genotypes under low-light. Low-light treatment significantly influenced many yield contributing traits and reduced grain yield substantially. The reduction in grain yield was highest in IET27590 followed by IET27597 and IET27592. The reduction is >40% in all the remaining entries with the exception of IET27595, IET275995 and IET27596 in which the reduction is <40%. These entries may be considered as relatively tolerant to low-light as the yield loss in these entries is less than the tolerant check swarnaprabha.

6.1 Influence of silicon on induced stress tolerance in rice genotypes

Locations: ***CBT, CTK, IIRR, KJT, KRK, MTU, PNR, PTB, REWA, CHN, NRRI and TTB***

Silicon (Si) is next to oxygen (O) in quantity on earth's crust. Silicon in combination with oxygen forms silicon dioxide (SiO_2) which is also known as silica. Rice exhibits the greatest uptake of silicic acid in the grass family. With the application of large quantity of silicon fertilizers, rice can accumulate silicon in the stem and leaves up to 10- 15% of its dry weight. Research findings from China reveal that rice yield of 7.5 ton/ha require 750-500 kg of silica. On an average, 1,125 kg of silica is required to achieve that yield. In view of the importance of silica in rice nutrition, a trial was conducted at different AICRIP locations spread across the country to investigate the role of silicon in increasing productivity of rice and study it's effects on imparting abiotic stress tolerance. The trial is conducted in split-plot design with following treatments with the objective to study the effect of silicon (Silixol @400ml in 200 litres/acre (as spray) were used at active tillering, panicle initiation, 50% flowering and milky grain stages. The experimental lay-out was split-plot with three replications. The treatments include T1=Control (water spray), T2=0.8% Silicon, T3=water stress, T4=Water stress+ Silicon. Water stress was imposed after PI stage by withholding irrigation. The mean days to flowering (mean of all locations and genotypes) was not significantly affected by silicon application and water stress (*Table 6.1.1*). The mean days to flowering (DF) is 96, 96, 94, and 94 days, respectively at Control, T1, T2, T3 and T4. (Fig. 1) The interaction between Location x treatment was found to be significant ($p<0.01$). The mean DF (mean of all treatments and genotypes) varied between 91 days (PNR) to 116 (IIRR) followed by 112 (Ranchi). Significant interaction was observed between Location x Variety. However, the interaction between Variety x Treatment was non-significant. However, the three way interaction between Treatment x Variety x Location was found to be significant.

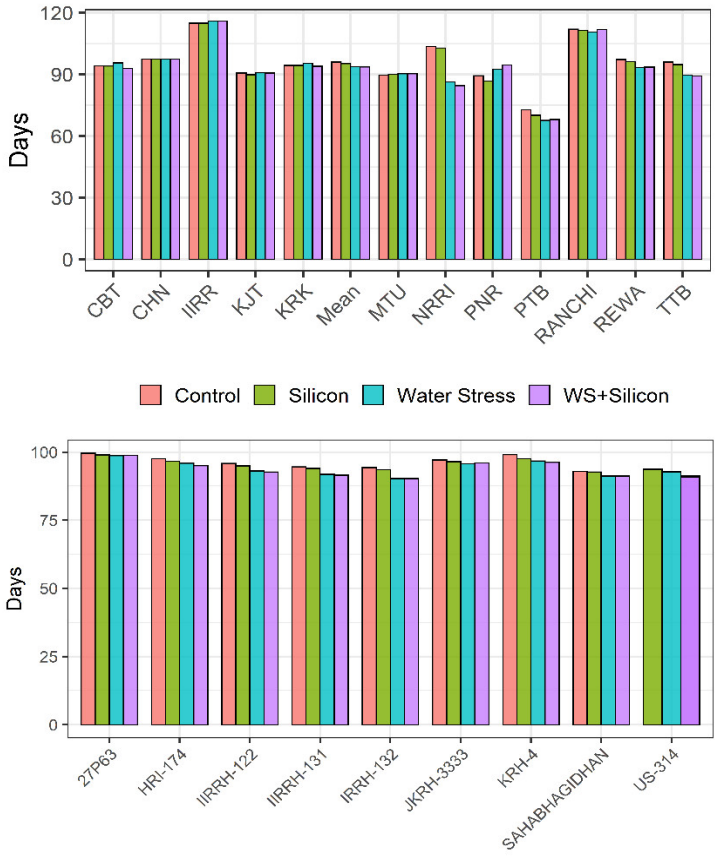


Fig. 6.1.1: Influence of silicon (T2), Water Stress (T3) and WS+Si (T4) on days to flowering of selected rice varieties. Each value represents the mean of 3 replications.

The days to maturity (DM) was significantly ($p<0.01$) influenced by the treatments. The mean (average of all locations) was increased from 110 days under control to 114 days with silicon application (T1). However, imposition of water stress reduced the DM to 106 days and application of silicon on water stressed crop resulted in marginal improvement in DM to 108 days (*Table* 6.2.2). The interaction between Treatment x Location was found to be significant implying that the treatment effect varied among the locations.

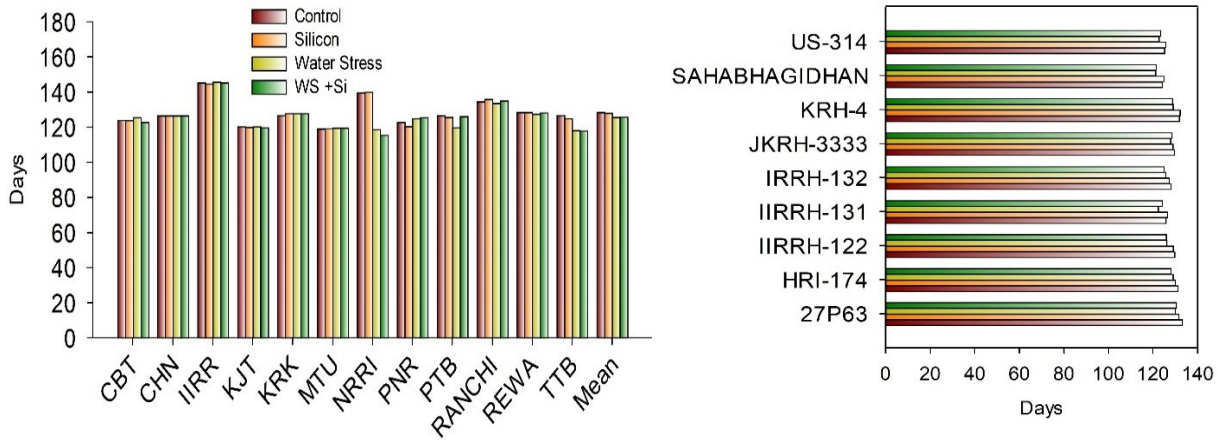


Fig. 6.1.2: Influence of silicon (T2), Water Stress (T3) and WS+Si (T4) on days to maturity of selected rice varieties. Each value represents the mean of 3 replications.

The mean DM (mean of varieties and treatments) varied between a maximum of 146 days (IIRR) to 123 days(TTB) with a mean of 127 days. Significant differences were observed amongst the genotypes for DM and the interaction between location x variety was also found to be significant ($p<0.01$). However, the interaction between Variety x Treatment was non-significant. However, the three way interaction between Treatment x Variety x Location was found to be highly significant (*Table 6.1.2*).

Plant height was significantly ($p<0-.01$) affected by the treatments (*Table 6.1.3*). The mean plant height under control treatment is 110.4 cm where as under silicon application, the mean plant height was 114.0 cm, whereas under water stress treatment (T3) the mean plant height was reduced to 105.9 cm. When water stress and silicon were applied together the mean plant height was partially improved to 107.6 cm. The interaction between Location x Treatment was found to be highly significant ($p<0.01$) implying that the applied treatment effect varied amongst the locations. The mean plant height (mean of all genotypes) varied between 89.5 cm (CBT) to 136 cm (KRK) followed by MTU (131.4 cm). Significant ($p<0.01$) differences were observed amongst the genotypes included in this study. The mean plant height (mean of all locations and treatments) varied between 91.7 cm (Sahabhagidhan) to 105.5 cm (KRH-4). However, the interaction effect between Treatment x Variety was statistically non-significant *(Table)*. The interaction between Treatment x Variety and three way interaction between Treatment x Variety x Location was found to be non-significant.

Total shoot weight recorded at flowering stage was not significantly influenced by the treatments *(Table 6.1.7).* However, the interaction between Treatment x Location was found to be highly significant ($p<0.01$) indicating that the response to the treatment was not uniform across the locations. Application of silicon had resulted in >10% increase in mean (mean of all varieties and locations) shoot weight recorded at flowering stage in comparison with control treatment. The mean shoot weight was not influenced significantly by water stress (T3) alone at flowering stage. However, application of silicon along with water stress (T4) had resulted in marginal increase (>4% over control) in shoot weight (*Table 6.1.7).* Significant differences were observed amongst the varieties ($p<0.01$). The mean shoot weight (mean of all treatments and locations) was highest in KRH-4 and minimum shoot weight was recorded in Sahabhagidhan. The mean shoot weight (mean of all treatments and varieties) was highest at CHN centre followed by KJT and PNR centres and minimum shoot weight was recorded at MTU followed by TTB and NRRI. The interaction between Variety

x Treatment was non-significant and the three way interaction between Treatment x Variety x Location was also found to be non-significant *(Table 6.1.7).*

The number of panicle m^{-2} (NP) is an important yield trait which was recorded at harvest. The mean NP was not significantly influenced by the treatments (*Table 6.1.9).* Application of silicon had resulted in >6% increase in NP. The mean NP was not significantly influenced by imposition of water stress (T3) or when WS and Silicon were applied together(T4). The interaction between Variety x Treatment was significant *(p<0.01)* implying that the treatments effect is not uniform across the locations. The differences amongst the varieties was found to be highly significant (p<0.05). The mean NP was highest in HRI-174 followed by 27P63 and JKRH-3333. The interaction between variety x location is highly significant (p<0.01) indicating that the performance of the varieties varied amongst the locations *(Table 6.1.9).* The interaction between Treatment x Variety was non-significant. The three way interaction between Treatment x Variety x Location was found to be highly significant *(p<0.01).*

Number of filled grains per panicle (GNP) is very important yield related trait which show significant change. Application of silicon had resulted in marginal improvement in mean GNP (mean of all locations and varieties). Imposition of water stress (T3) significantly reduced the GNP (>15% reduction in comparison with control). Application of silicon to water stressed crop (T4) significantly reversed negative effects of water stress. The interaction between Treatment x Location is significant (p<0.01) indicating that the treatment effect is not uniform across the locations. Maximum number of GNP were recorded at PNR, CHN and Ranchi followed by MTU.

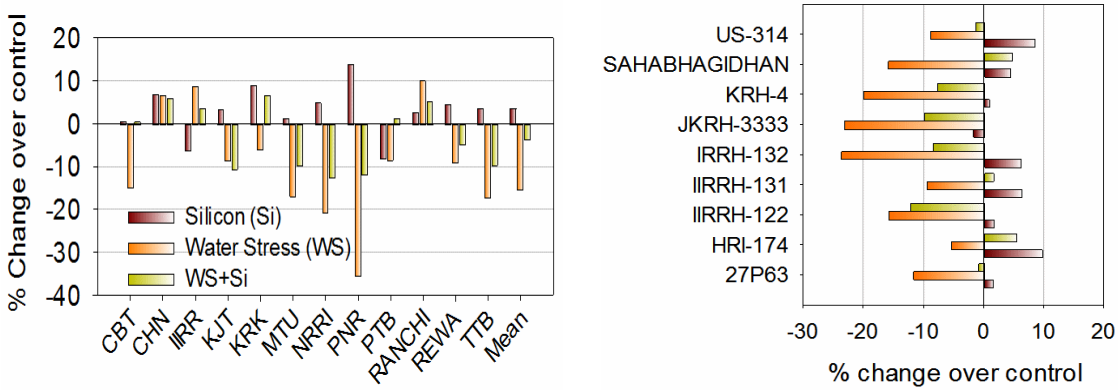


Fig. 6.1.3 influence of silicon (T2), water stress (T3) and WS+Si (T4) on number of filled grains per panicle in different rice varieties at different locations during kharif-2019

Significant differences in mean GNP were found to be significant *(p<0.01)* amongst the varieties. HRI-174 show maximum increase in GNP when silicon was applied followed by US-314. The percent change in GNP in comparison with control was minimum in JKRH-3333, KRH-4, IIRRH-122 (*Fig.6.1.3).* The interaction between Location x Variety was significant *(p<0.01)* indicating that the varieties performed different at different locations. However, the interaction between Treatment x Variety was non-significant. Nevertheless, the three way interaction between Treatment x Variety x Location was found to be significant *(p<0.01).*

The mean 1000 grain weight/Test weight (TW) was not significantly affected by the treatments. Application of silicon had not resulted in any significant change in TW. However, imposing water stress (T3) after flowering stage reduced mean TW by >9% in comparison with control treatment (Table). Application of silicon on water stressed crop (T4) resulted in significantly reversed the deleterious effect of water stress.

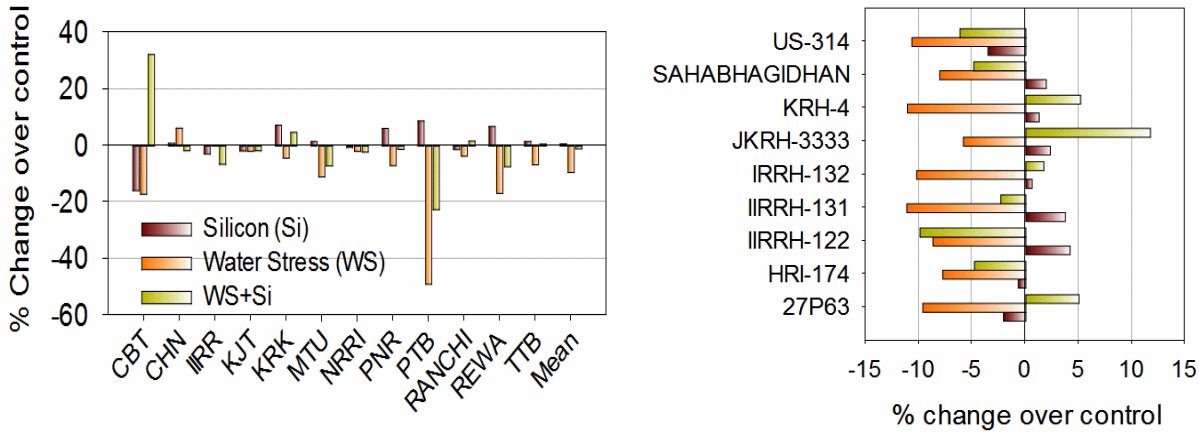


Fig. 6.1.4 influence of silicon (T2), water stress (T3) and WS+Si (T4) on number of 1000 grain weight in different rice varieties at different locations during kharif-2019. Each bar represents the percent reduction in comparison with control.

The interaction between Treatment x location was significant *(p<0.01)* implying that the effect of treatment differed amongst the locations. The mean TW (mean of all treatments and varieties) varied from a minimum of 16.5% (KRK) to a maximum of 23.4 g (KJT) followed by CHN (22.4 g). Significant differences were observed in mean TW amongst the varieties. The mean TW varied between 21.8 (IIRRH-122) to 18.3 (27P63). The interaction between Location x Variety was also found to be significant (p<0.01). However, the interaction between Treatment x Variety was non-significant indicating that the varieties did not responded differently to applied treatments. However, the three way interaction between Treatment x Variety x Location was found to be statistically significant *(p<0.01).*

Total above ground dry matter (TDM) was recorded after physiological maturity and harvest. The data presented in (*Table 6.1.14)*. Indicated that treatments had significant ($p<0.01$) influence on the accumulation of dry matter. Application of silicon (T2) had resulted in >11% increase in mean (mean of all varieties and locations) TDM in comparison with control treatment. Imposing water stress (T3) during reproductive stage resulted in >10% reduction in mean TDM . Application of silicon on water stressed crop (T4) mitigated the negative effect of water stress. In fact it restored the mean TDM value at par with the control treatment. The interaction between Treatment x Location was found to be highly significant ($p<0.01$) implying that the treatment effect varied amongst the locations. Increase in TDM by silicon application (T2) was maximum at PNR followed by TTB *(Fig. 6.1.5)* Minimum improvement was observed at MTU followed by IIRR where in the increase in mean TDM is negligible. Similarly, the interaction between Variety x Location was also found to be significant indicating that the varieties behaved differently at different locations. However, the interaction between Treatment x Varieties was non-significant. Nevertheless, maximum improvement in mean

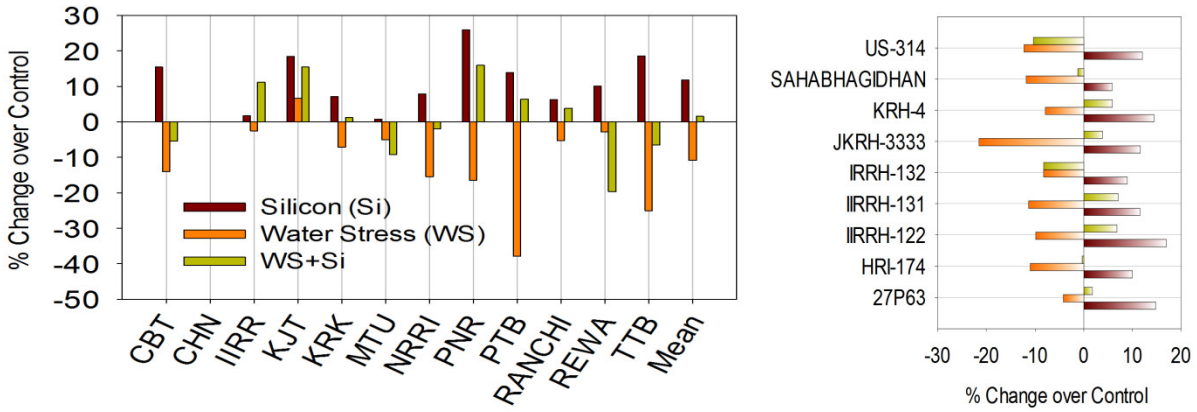


Fig. 6.1.5 influence of silicon (T2), water stress (T3) and WS+Si (T4) on TDM in different rice varieties at different locations during kharif-2019. Each bar represents the percent reduction in comparison with control.

TDM (mean of all locations) was observed in case of IRRH-122 followed by27P63 and KRH-4. Similarly water stress (T3) caused maximum reduction in mean TDM in JKRH-3333 where as 27P63 followed by KRH-4 and IRRH-131 recorded minimum reduction in mean TDM. Furthermore, applicaton of silicon on water stressed plants (T4) reversed the negative effect of WS in all tested varieties except US-314, Sahabhagidhan and 27P63 (*Fig .6.1.5).* The three way interaction between Treatment x Variety x Location was found to be highly significant *($p<0.01$).*

Grain yield (g/m^2) was significantly (p<0.01) by the treatments (*Table* 6.1.15). Application of silicon (T2) resulted in >11% increase in mean grain yield (mean of all varieties and treatments) in comparison with control (T1). Similarly, imposition of water stress (T3) by suspending irrigation during reproductive stage had resulted in <10% increase in mean GY. Application of silicon on water stressed plants (T4) significantly reduced the yield loss caused by water stress. A marginal non-significant improvement in yield was noticed in comparison with control treatment *(Fig.6.1.6).*

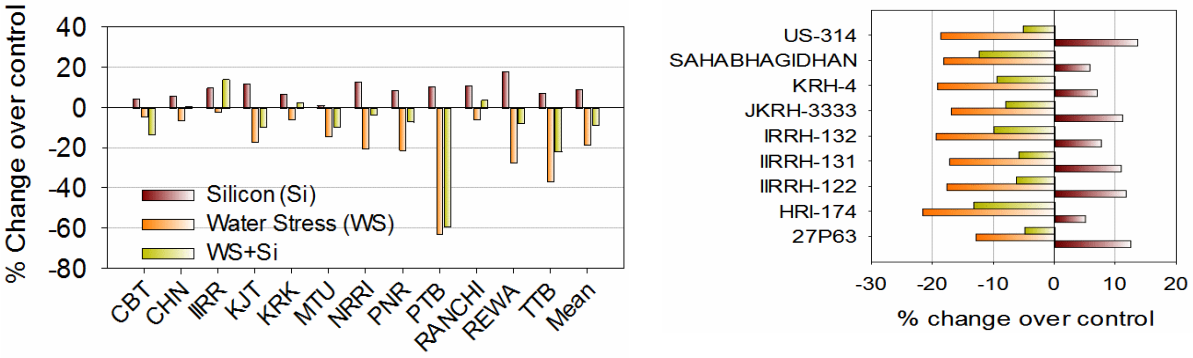


Fig. 6.1.6 influence of silicon (T2), water stress (T3) and WS+Si (T4) on grain yield in different rice varieties at different locations during kharif-2019. Each bar represents the percent reduction in comparison with control.

The interaction between Treatment x Location was highly significant (o<0.01) implying that the treatments effect is not uniform across the locations. Silicon application (T1) resulted in an improvement in GY in comparison with control (T1). The increase in grain yield is maximum at REWA (>17% in crease over control) followed by KJT and NRRI (<12% increase). Similarly, imposition of WS (T3) caused significant reduction in yield and the extent of reduction varied from location to location. Maximum reduction in GY was observed at PTB followed by TTB and REWA (*Fig.6.1.6).* Application of Si on water stressed crop (T4) resulted in reduction in yield loss caused by WS. The effect of more pronounced at IIRR and RANCHI centres *(Table 6.1.15).* The interaction between Treatment x Location and Variety x Location are found to be significant indicating that the treatment effect varied from location to location and varieties differed in their response to treatments. Significant differences were observed amongst the varieties. The mean GY (mean of all locations) varied between 566 g/m^2 (IRRH-132) to 480 g/m^2 (Sahabhagidhan). Application of Si showed maximum effect in JKRH-3333 followed by IIRRH-122 (Fig.). Imposition of water stress show maximum effect on HRI-174 followed by IRRH-132 and KRH-4.

Application Silicon on water stressed plants resulted in maximum mitigation of yield reduction caused by water stress in Sahabhagidhan followed by IIRRH-131 *(Fig.6.1.6).*

Harvest index is one of the most important yield trait which was measured after harvest. The effect of treatments was non-significant (*Table 6.1.17).* However, the interaction between Treatment x Location was found to be significant ($p<0.01$) the effect of treatment was not uniform across locations. Similarly, the interaction between Treatment x Variety was non-significant. The mean HI was highest at IIRR centre followed by MTU (Table 6.1.17).

Summary & conclusions

In view of the importance of silica in rice nutrition, a trial was conducted at different AICRIP locations spread across the country. The experimental lay-out was split-plot with three replications. The treatments include T1 = Control (water spray), T2 =0.8% Silicon, T3 = Water stress T4 =. Silicon + water stress, Water stress was imposed after PI stage by withholding irrigation. The results revealed that application of silicon (T2) resulted in >11% increase in mean grain yield(mean of all varieties & locations) . The increase in grain yield is maximum at REWA (>17% in crease over control) followed by KJT and NRRI (<12% increase). Similarly, imposition of WS (T3) caused significant reduction in yield and the extent of reduction varied from location to location. Maximum reduction in GY was observed at PTB followed by TTB and REWA. Imposition of water stress (T3) resulted in >10% reduction in mean grain yield. Maximum reduction in GY was observed at PTB followed by TTB and REWA The mean GY (mean of all locations) varied between 566 g/m^2 (IRRH-132) to 480 g/m^2 (Sahabhagidhan). Application of Silicon showed maximum effect in JKRH-3333 followed by IIRRH-122. Imposition of water stress show maximum effect on HRI-174 followed by IRRH-132 and KRH-4. Application Silicon on water stressed plants resulted in maximum mitigation of yield reduction caused by water stress in Sahabhagidhan followed by IIRRH-131.

Table 6.1.1 Influence of Silica application on Days to flowering at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	110	104	117	98	91	96	107	104	70	108	95	96	100
	2	HRI-174	101	103	119	87	90	97	107	96	72	100	100	98	98
	3	IIRRH-122	94	93	117	92	79	86	107	80	78	121	102	100	96
	4	IIRRH-131	93	94	109	87	112	82	99	81	75	113	98	92	95
	5	IRRH-132	88	93	118	89	78	88	104	82	73	120	104	96	94
	6	JKRH-3333	91	103	120	93	86	96	107	103	75	105	92	92	97
	7	KRH-4	100	102	117	89	87	97	107	104	70	119	100	96	99
	8	SB.DHAN	89	92	109	88	112	84	99	76	67	113	90	96	93
	9	US-314	82	93	109	93	114	82	96	78	76	109	94	98	94
		T1 Mean	**94**	**97**	**115**	**91**	**94**	**90**	**104**	**89**	**73**	**112**	**97**	**96**	**96**
T2 (0.6% Silicon)	1	27P63	108	104	117	94	91	95	107	103	77	108	91	92	99
	2	HRI-174	98	103	119	85	92	98	107	92	65	99	104	97	97
	3	IIRRH-122	95	93	117	91	78	85	105	77	75	119	104	100	95
	4	IIRRH-131	94	94	109	85	113	83	101	78	73	114	92	92	94
	5	IRRH-132	87	93	118	89	79	87	102	78	71	118	107	92	93
	6	JKRH-3333	92	103	120	94	86	96	104	101	73	105	92	92	97
	7	KRH-4	100	102	117	89	86	97	105	103	67	117	94	95	98
	8	SB.DHAN	89	92	109	88	113	85	99	73	64	113	91	96	93
	9	US-314	84	93	109	93	112	83	96	77	66	111	92	97	93
		T2 Mean	**94**	**97**	**115**	**90**	**94**	**90**	**103**	**87**	**70**	**111**	**96**	**95**	**95**
T3 (water stress)	1	27P63	110	104	118	98	90	96	95	107	77	106	97	86	99
	2	HRI-174	112	103	120	87	90	98	95	99	61	99	95	92	96
	3	IIRRH-122	91	93	118	93	81	86	86	82	74	119	100	94	93
	4	IIRRH-131	87	94	110	86	119	82	81	85	67	113	91	86	92
	5	IRRH-132	91	93	119	90	78	87	84	86	63	117	88	88	90
	6	JKRH-3333	100	103	121	94	86	96	88	107	74	104	88	87	96
	7	KRH-4	93	102	118	88	85	98	95	106	67	117	100	91	97
	8	SB.DHAN	91	92	110	88	115	85	75	80	63	112	92	91	91
	9	US-314	86	93	110	93	114	85	79	81	63	109	91	92	91
		T3 Mean	**96**	**97**	**116**	**91**	**95**	**90**	**86**	**93**	**68**	**111**	**93**	**90**	**94**
T4 (water stress+silicon)	1	27P63	108	104	118	98	90	96	94	110	77	111	92	86	99
	2	HRI-174	106	103	120	87	90	98	83	101	64	99	98	92	95
	3	IIRRH-122	87	93	118	94	78	87	82	86	74	117	103	94	93
	4	IIRRH-131	90	94	110	85	114	84	82	85	67	113	88	85	91
	5	IRRH-132	86	93	119	90	78	86	82	87	64	117	94	88	90
	6	JKRH-3333	98	103	121	93	87	97	92	110	74	107	85	87	96
	7	KRH-4	96	102	118	89	84	97	87	109	67	115	101	90	96
	8	SB.DHAN	86	92	110	88	112	85	78	82	63	115	93	90	91
	9	US-314	80	93	110	93	113	83	81	82	63	112	89	91	91
		T4 Mean	**93**	**97**	**116**	**91**	**94**	**90**	**85**	**95**	**68**	**112**	**94**	**89**	**94**
		Grand Mean	**94**	**97**	**115**	**91**	**95**	**90**	**94**	**91**	**70**	**112**	**95**	**92**	**95**
		LSD (Silicon)							NS						
		LSD (Center x Silicon)							0.89**						
		LSD (Variety)							ns						
		LSD (Center x Variety)							1.23**						
		LSD (Silicon x Variety)							ns						
		LSD (Center x Silicon x Variety)							2.5**						
		CV (%) Silicon							1.3						
		CV (%) Residual							1.22						

SB.Dhan= Sahabhagidhan

Table 6.1.2 Influence of Silica application on Days to maturity at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	140	133	148	128	128	125	143	132	125	134	133	127	133
	2	HRI-174	131	133	150	117	128	126	143	130	132	121	132	130	131
	3	IIRRH-122	124	122	148	121	128	118	143	121	124	142	134	130	130
	4	IIRRH-131	123	124	140	119	128	111	135	120	123	133	130	123	126
	5	IRRH-132	118	123	150	121	128	118	140	117	123	142	129	127	128
	6	JKRH-3333	121	131	151	123	128	127	143	132	123	128	124	123	130
	7	KRH-4	130	131	148	115	128	126	143	131	132	139	128	128	132
	8	SB.DHAN	119	121	136	118	123	114	135	108	130	139	120	125	124
	9	US-314	112	123	138	123	124	111	133	116	130	134	128	130	125
		T1 Mean	**124**	**127**	**146**	**121**	**127**	**119**	**140**	**123**	**127**	**135**	**129**	**127**	**129**
T2 (0.6% Silicon)	1	27P63	138	133	149	127	128	124	143	130	120	131	134	121	131
	2	HRI-174	128	133	149	115	128	128	143	126	132	121	129	125	130
	3	IIRRH-122	125	122	148	120	128	114	143	119	120	145	131	132	129
	4	IIRRH-131	124	124	137	117	128	113	138	118	123	138	132	125	126
	5	IRRH-132	117	123	149	120	128	116	138	117	123	142	130	122	127
	6	JKRH-3333	122	131	150	123	128	125	143	128	123	131	120	122	129
	7	KRH-4	130	131	147	116	128	125	143	127	132	145	133	127	132
	8	SB.DHAN	119	121	137	118	128	115	138	108	130	136	122	126	125
	9	US-314	114	123	137	123	128	115	133	113	130	138	128	126	126
		T2 Mean	**124**	**127**	**145**	**120**	**128**	**120**	**140**	**121**	**126**	**136**	**129**	**125**	**128**
T3 (water stress)	1	27P63	138	133	149	127	128	126	125	132	126	134	130	116	130
	2	HRI-174	136	133	152	116	128	127	115	132	126	124	128	119	128
	3	IIRRH-122	117	122	150	122	128	117	113	125	126	139	129	122	126
	4	IIRRH-131	120	124	137	118	128	114	113	123	126	142	129	115	124
	5	IRRH-132	116	123	149	119	128	116	113	122	126	139	130	117	125
	6	JKRH-3333	128	131	149	122	128	126	123	132	126	130	129	116	128
	7	KRH-4	126	131	148	118	128	126	118	132	128	139	131	119	129
	8	SB.DHAN	116	121	137	117	128	115	109	111	128	136	120	119	121
	9	US-314	110	123	138	122	128	113	113	122	126	134	131	120	123
		T3 Mean	**123**	**127**	**145**	**120**	**128**	**120**	**116**	**126**	**126**	**135**	**128**	**118**	**126**
T4 (water stress)	1	27P63	140	133	150	128	128	124	128	132	120	130	129	116	130
	2	HRI-174	142	133	150	117	128	127	128	132	120	121	128	120	129
	3	IIRRH-122	121	122	149	122	128	116	118	124	120	141	131	121	126
	4	IIRRH-131	117	124	138	118	128	111	113	123	120	133	126	115	122
	5	IRRH-132	121	123	150	122	128	116	118	121	120	140	132	117	126
	6	JKRH-3333	130	131	153	123	128	126	120	132	120	127	127	117	128
	7	KRH-4	123	131	149	114	128	128	128	132	120	144	129	120	129
	8	SB.DHAN	121	121	138	118	128	115	108	109	120	136	118	120	121
	9	US-314	116	123	137	123	128	114	110	121	120	132	127	120	123
		T4 Mean	**126**	**127**	**146**	**121**	**128**	**120**	**119**	**125**	**120**	**134**	**128**	**118**	**126**
		Grand Mean	**124**	**127**	**145**	**120**	**128**	**120**	**129**	**124**	**125**	**135**	**128**	**122**	**127**
		LSD (Silicon)							NS						
		LSD (Center x Silicon)							0.95**						
		LSD (Variety)							0.397**						
		LSD (Center x Variety)							1.36**						
		LSD (Silicon x Variety)							NS						
		LSD (Center x Silicon x Variety)							2.71**						
		CV (%) Silicon							1.05						
		CV (%) Residual							1.01						

SB.Dhan= Sahabhagidhan

Table 6.1.3 Influence of Silica application on Plant Height (cm) flowering at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	89	0	118	108	141	142	97	126	93	98	0	104	112
	2	HRI-174	89	0	100	116	187	122	103	105	101	98	0	109	113
	3	IIRRH-122	94	0	104	108	126	125	113	119	110	83	0	111	109
	4	IIRRH-131	88	0	99	116	124	145	110	115	105	97	0	111	111
	5	IRRH-132	86	0	109	113	149	126	101	119	85	89	0	106	108
	6	JKRH-3333	97	0	101	109	128	119	100	123	98	89	0	104	107
	7	KRH-4	103	0	117	126	172	147	111	135	97	91	0	125	122
	8	SB.DHAN	97	0	108	107	107	135	101	103	112	93	0	100	106
	9	US-314	86	0	95	122	117	127	99	110	105	93	0	100	106
		T1 Mean	**92**	**0**	**106**	**114**	**139**	**132**	**104**	**118**	**101**	**92**	**0**	**108**	**110**
T2 (0.6% Silicon)	1	27P63	93	0	111	112	136	141	97	132	98	102	0	105	113
	2	HRI-174	94	0	96	121	182	126	101	125	103	102	0	108	116
	3	IIRRH-122	99	0	111	113	131	130	117	139	108	89	0	115	115
	4	IIRRH-131	93	0	96	118	130	143	111	140	110	101	0	111	115
	5	IRRH-132	90	0	114	111	160	125	101	145	88	87	0	104	113
	6	JKRH-3333	102	0	100	109	149	119	100	132	101	95	0	104	111
	7	KRH-4	108	0	128	126	183	148	109	147	100	95	0	130	127
	8	SB.DHAN	102	0	105	108	111	133	99	110	113	95	0	97	107
	9	US-314	90	0	97	125	119	130	100	122	105	91	0	107	109
		T2 Mean	**97**	**0**	**106**	**116**	**145**	**133**	**104**	**132**	**103**	**95**	**0**	**109**	**114**
T3 (water stress)	1	27P63	80	0	107	108	146	143	90	115	100	101	0	99	109
	2	HRI-174	80	0	104	114	128	121	95	121	95	103	0	115	107
	3	IIRRH-122	84	0	113	112	135	125	101	124	107	91	0	98	109
	4	IIRRH-131	79	0	101	117	137	145	102	112	96	102	0	102	109
	5	IRRH-132	77	0	109	109	124	122	101	126	84	89	0	107	105
	6	JKRH-3333	87	0	107	106	141	118	85	118	96	98	0	104	106
	7	KRH-4	93	0	126	124	149	144	106	124	92	92	0	121	117
	8	SB.DHAN	87	0	111	108	115	132	103	101	107	95	0	93	105
	9	US-314	77	0	99	124	113	124	85	102	99	91	0	92	101
		T3 Mean	**83**	**0**	**108**	**114**	**132**	**131**	**96**	**116**	**97**	**96**	**0**	**104**	**108**
T4 (water stress+silicon)	1	27P63	84	0	127	107	149	143	86	114	92	101	0	106	111
	2	HRI-174	84	0	105	115	129	123	91	104	87	105	0	113	106
	3	IIRRH-122	89	0	116	111	125	125	95	110	97	88	0	83	104
	4	IIRRH-131	83	0	108	114	128	144	97	106	88	99	0	105	107
	5	IRRH-132	81	0	120	108	131	122	99	116	77	92	0	105	105
	6	JKRH-3333	92	0	104	105	119	115	85	118	85	91	0	107	102
	7	KRH-4	98	0	131	126	138	143	105	115	82	94	0	121	115
	8	SB.DHAN	91	0	106	111	106	133	90	107	99	97	0	92	103
	9	US-314	81	0	96	121	116	124	84	101	92	93	0	91	100
		T4 Mean	**87**	**0**	**112**	**113**	**127**	**130**	**92**	**110**	**89**	**96**	**0**	**103**	**106**
		Grand Mean	**90**	**0**	**108**	**114**	**136**	**131**	**99**	**119**	**98**	**95**	**0**	**106**	**110**
		LSD (Silicon)							2.96**						
		LSD (Center x Silicon)							10.28**						
		LSD (Variety)							2.68**						
		LSD (Center x Variety)							9.10**						
		LSD (Silicon x Variety)							NS						
		LSD (Center x Silicon x Variety)							NS						
		CV (%) Silicon							15.7						
		CV (%) Residual							9.47						

SB.Dhan= Sahabhagidhan

Table 6.1.4 Influence of Silica application on Leaf Area Index at Tillering different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	IIRR	KRK	NRRI	PNR	PTB	TTB	Grand Mean
T1 (Control)	1	27P63	3.92	4.03	1.00	2.18	2.15	3.99	0.00	2.47
	2	HRI-174	6.80	4.81	1.13	2.39	1.84	5.90	0.00	3.27
	3	IIRRH-122	4.24	3.59	1.14	2.77	2.13	4.62	0.00	2.64
	4	IIRRH-131	2.35	2.96	0.62	2.43	2.16	4.71	0.00	2.18
	5	IRRH-132	3.39	3.02	0.93	2.21	2.21	4.27	0.00	2.29
	6	JKRH-3333	4.64	4.55	0.91	2.56	2.02	4.06	0.00	2.68
	7	KRH-4	6.22	4.46	1.19	2.69	1.93	4.11	0.00	2.94
	8	SB.DHAN	2.66	3.02	0.81	2.45	1.61	4.01	0.00	2.08
	9	US-314	4.55	4.11	0.93	2.33	2.43	4.39	0.00	2.68
		T1 Mean	**4.31**	**3.84**	**0.96**	**2.44**	**2.05**	**4.45**	**0.00**	**2.58**
T2 (0.6% Silicon)	1	27P63	4.18	3.56	1.14	3.45	2.71	4.29	0.00	2.76
	2	HRI-174	7.25	2.66	1.21	2.94	2.50	3.71	0.00	2.90
	3	IIRRH-122	4.52	4.17	1.25	3.06	2.45	5.04	0.00	2.93
	4	IIRRH-131	2.50	3.68	0.93	3.71	2.43	4.25	0.00	2.50
	5	IRRH-132	3.62	4.54	1.06	2.54	2.91	3.41	0.00	2.58
	6	JKRH-3333	4.95	3.64	1.69	3.40	2.51	3.01	0.00	2.74
	7	KRH-4	6.64	3.92	0.91	3.07	2.48	3.57	0.00	2.94
	8	SB.DHAN	2.84	2.09	1.14	2.99	2.75	3.43	0.00	2.18
	9	US-314	4.86	3.44	0.91	3.31	3.13	4.97	0.00	2.94
		T2 Mean	**4.59**	**3.52**	**1.14**	**3.16**	**2.65**	**3.96**	**0.00**	**2.72**
T3 (water stress)	1	27P63	3.82	3.13	1.02	2.22	2.15	1.89	0.00	2.03
	2	HRI-174	6.63	2.70	0.87	2.92	2.42	1.66	0.00	2.46
	3	IIRRH-122	4.03	4.37	1.17	2.47	2.22	1.00	0.00	2.18
	4	IIRRH-131	2.29	2.09	1.36	2.99	2.24	1.38	0.00	1.76
	5	IRRH-132	3.31	2.87	0.74	2.18	2.62	0.99	0.00	1.81
	6	JKRH-3333	4.53	3.22	1.26	3.20	1.78	1.98	0.00	2.28
	7	KRH-4	6.07	2.82	1.35	2.95	1.62	1.26	0.00	2.30
	8	SB.DHAN	2.59	3.75	1.04	2.63	2.19	1.17	0.00	1.91
	9	US-314	4.44	3.66	1.33	2.75	2.66	3.59	0.00	2.63
		T3 Mean	**4.19**	**3.18**	**1.13**	**2.70**	**2.21**	**1.66**	**0.00**	**2.15**
T4 (water stress+silicon)	1	27P63	3.33	4.05	1.03	2.31	1.84	1.14	0.00	1.96
	2	HRI-174	5.79	3.35	1.12	2.36	1.61	0.89	0.00	2.16
	3	IIRRH-122	3.52	2.71	1.12	2.22	1.80	0.75	0.00	1.73
	4	IIRRH-131	2.00	2.98	0.84	2.73	1.89	0.96	0.00	1.63
	5	IRRH-132	2.89	3.66	0.67	2.36	1.95	1.19	0.00	1.82
	6	JKRH-3333	3.95	4.70	0.79	2.32	1.59	1.66	0.00	2.14
	7	KRH-4	5.30	3.24	1.04	2.67	1.55	1.75	0.00	2.22
	8	SB.DHAN	2.26	3.08	0.82	2.32	1.44	0.56	0.00	1.50
	9	US-314	3.88	3.40	0.80	2.21	1.67	2.26	0.00	2.03
		T4 Mean	**3.66**	**3.46**	**0.91**	**2.39**	**1.70**	**1.24**	**0.00**	**1.91**
		Grand Mean	**4.19**	**3.50**	**1.04**	**2.67**	**2.16**	**2.83**	**0.00**	**2.34**
		LSD (Silicon)				NS				
		LSD (Center x Silicon)				0.407**				
		LSD (Variety)				ns				
		LSD (Center x Variety)				0.584**				
		LSD (Silicon x Variety)				NS				
		LSD (Center x Silicon x Variety)				1.16**				
		CV (%) Silicon				24				
		CV (%) Residual				24				

SB.Dhan= Sahabhagidhan

Table 6.1.5 Influence of Silica application on Leaf Area Index at Panicle Initiation different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	IIRR	KRK	NRRI	PNR	PTB	TTB	Grand Mean
T1 (Control)	1	27P63	4.53	8.06	3.37	0.00	4.33	3.03	0.00	4.67
	2	HRI-174	7.84	4.53	3.45	0.00	3.64	5.13	0.00	4.92
	3	IIRRH-122	4.90	5.66	3.04	0.00	3.89	3.73	0.00	4.24
	4	IIRRH-131	2.72	5.01	1.26	0.00	4.09	4.90	0.00	3.60
	5	IRRH-132	3.93	4.86	1.60	0.00	3.84	7.23	0.00	4.29
	6	JKRH-3333	5.36	6.54	2.60	0.00	3.53	4.90	0.00	4.59
	7	KRH-4	7.18	6.94	2.88	0.00	4.16	6.53	0.00	5.54
	8	SB.DHAN	3.08	6.06	1.61	0.00	2.57	4.90	0.00	3.64
	9	US-314	5.26	6.04	2.13	0.00	3.60	3.97	0.00	4.20
		T1 Mean	**4.98**	**5.97**	**2.44**	**0.00**	**3.74**	**4.93**	**0.00**	**4.41**
T2 (0.6% Silicon)	1	27P63	4.83	6.03	3.15	0.00	4.90	5.60	0.00	4.90
	2	HRI-174	8.35	6.25	2.37	0.00	4.81	4.43	0.00	5.24
	3	IIRRH-122	5.22	5.99	2.41	0.00	4.49	3.73	0.00	4.37
	4	IIRRH-131	2.90	4.72	1.49	0.00	4.44	4.90	0.00	3.69
	5	IRRH-132	4.19	5.63	1.82	0.00	4.19	7.00	0.00	4.56
	6	JKRH-3333	5.71	6.09	3.49	0.00	4.46	6.53	0.00	5.26
	7	KRH-4	7.65	7.34	2.87	0.00	4.48	8.17	0.00	6.10
	8	SB.DHAN	3.28	4.40	1.32	0.00	4.20	6.30	0.00	3.90
	9	US-314	5.60	6.31	2.07	0.00	4.28	5.13	0.00	4.68
		T2 Mean	**5.30**	**5.86**	**2.33**	**0.00**	**4.47**	**5.76**	**0.00**	**4.75**
T3 (water stress)	1	27P63	4.41	4.38	2.24	0.00	3.62	1.56	0.00	3.24
	2	HRI-174	7.64	4.80	2.58	0.00	3.92	2.31	0.00	4.25
	3	IIRRH-122	4.66	4.02	2.92	0.00	4.40	1.49	0.00	3.50
	4	IIRRH-131	2.65	3.71	1.88	0.00	3.42	2.22	0.00	2.78
	5	IRRH-132	3.82	4.59	1.20	0.00	3.45	1.03	0.00	2.82
	6	JKRH-3333	5.22	5.60	2.33	0.00	3.33	2.54	0.00	3.80
	7	KRH-4	6.99	6.35	2.58	0.00	3.68	1.56	0.00	4.23
	8	SB.DHAN	3.00	5.15	1.13	0.00	3.12	1.21	0.00	2.72
	9	US-314	5.12	4.19	2.20	0.00	3.45	5.39	0.00	4.07
		T3 Mean	**4.83**	**4.75**	**2.12**	**0.00**	**3.60**	**2.15**	**0.00**	**3.49**
T4 (water stress+silicon)	1	27P63	3.85	5.13	2.47	0.00	3.15	2.47	0.00	3.41
	2	HRI-174	6.67	6.86	1.62	0.00	2.67	1.98	0.00	3.96
	3	IIRRH-122	4.06	7.08	2.89	0.00	3.29	1.24	0.00	3.71
	4	IIRRH-131	2.31	4.55	1.23	0.00	2.90	1.63	0.00	2.53
	5	IRRH-132	3.34	5.88	1.45	0.00	2.84	2.26	0.00	3.16
	6	JKRH-3333	4.56	5.90	1.79	0.00	3.07	1.98	0.00	3.46
	7	KRH-4	6.11	6.66	1.91	0.00	3.64	1.63	0.00	3.99
	8	SB.DHAN	2.62	5.15	0.93	0.00	2.32	1.05	0.00	2.41
	9	US-314	4.47	3.72	1.94	0.00	3.46	2.71	0.00	3.26
		T4 Mean	**4.22**	**5.66**	**1.80**	**0.00**	**3.04**	**1.88**	**0.00**	**3.32**
		Grand Mean	**4.83**	**5.56**	**2.17**	**0.00**	**3.71**	**3.68**	**0.00**	**3.99**
		LSD (Silicon)				0.289*				
		LSD (Center x Silicon)				1.02**				
		LSD (Variety)				0.354*				
		LSD (Center x Variety)				0.937**				
		LSD (Silicon x Variety)				NS				
		LSD (Center x Silicon x Variety)				1.4*				
		CV (%) Silicon				29				
		CV (%) Residual				31				

SB.Dhan= Sahabhagidhan

Table 6.1.6 Influence of Silica application on Leaf Area Index at flowering different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	IIRR	KRK	NRRI	PNR	PTB	TTB	Grand Mean
T1 (Control)	1	27P63	4.78	5.57	3.66	2.77	5.49	5.00	4.64	4.56
	2	HRI-174	8.27	4.69	4.58	2.92	5.19	3.67	5.27	4.94
	3	IIRRH-122	5.18	3.65	2.96	3.31	5.58	4.67	3.46	4.11
	4	IIRRH-131	2.88	3.36	2.13	3.32	5.12	3.33	3.90	3.44
	5	IRRH-132	4.15	3.34	3.11	2.65	5.67	5.67	3.93	4.07
	6	JKRH-3333	5.66	5.50	2.28	3.22	5.22	7.67	3.85	4.77
	7	KRH-4	7.57	5.71	3.57	3.33	5.37	4.67	5.66	5.13
	8	SB.DHAN	3.25	4.76	1.85	2.81	4.53	4.00	4.67	3.70
	9	US-314	5.55	5.70	1.57	3.74	5.47	3.33	4.53	4.27
		T1 Mean	**5.25**	**4.70**	**2.86**	**3.12**	**5.29**	**4.67**	**4.43**	**4.33**
T2 (0.6% Silicon)	1	27P63	5.10	4.27	2.68	4.42	5.89	5.33	5.47	4.74
	2	HRI-174	8.82	4.95	4.67	4.32	5.93	6.00	5.36	5.72
	3	IIRRH-122	5.52	4.09	2.40	3.50	5.90	4.67	3.45	4.22
	4	IIRRH-131	3.07	3.66	2.20	3.79	5.52	5.00	3.97	3.89
	5	IRRH-132	4.42	4.18	2.89	3.32	5.87	11.67	4.05	5.20
	6	JKRH-3333	6.03	5.89	3.23	3.98	5.46	5.33	3.31	4.75
	7	KRH-4	8.07	5.64	4.25	5.79	5.54	6.00	5.61	5.84
	8	SB.DHAN	3.47	3.50	2.37	3.29	5.59	7.33	4.82	4.34
	9	US-314	5.92	4.30	1.86	3.92	5.66	4.67	5.33	4.52
		T2 Mean	**5.60**	**4.50**	**2.95**	**4.04**	**5.71**	**6.22**	**4.60**	**4.80**
T3 (water stress)	1	27P63	4.66	6.13	3.38	3.88	5.33	2.33	3.95	4.24
	2	HRI-174	8.06	6.98	1.74	3.61	5.71	3.67	4.40	4.88
	3	IIRRH-122	4.92	4.67	2.14	2.85	5.51	2.00	2.93	3.57
	4	IIRRH-131	2.80	3.87	2.66	3.23	5.04	1.00	3.60	3.17
	5	IRRH-132	4.04	4.05	1.98	3.12	4.62	2.00	2.91	3.25
	6	JKRH-3333	5.51	5.85	2.59	3.42	4.92	3.33	3.00	4.09
	7	KRH-4	7.38	5.97	2.86	4.37	4.48	2.33	3.97	4.48
	8	SB.DHAN	3.17	4.26	2.59	3.10	4.91	1.67	3.88	3.37
	9	US-314	5.41	3.68	1.11	3.70	5.54	3.00	3.80	3.75
		T3 Mean	**5.11**	**5.05**	**2.34**	**3.48**	**5.12**	**2.37**	**3.60**	**3.87**
T4 (water stress+silicon)	1	27P63	4.07	5.46	4.27	3.10	4.18	3.00	3.44	3.93
	2	HRI-174	7.05	6.99	2.65	2.84	4.78	3.33	3.95	4.51
	3	IIRRH-122	4.29	5.78	2.33	2.56	4.94	2.33	2.65	3.56
	4	IIRRH-131	2.44	5.34	1.94	2.71	4.18	2.67	3.87	3.31
	5	IRRH-132	3.52	3.61	2.56	2.60	3.91	3.33	2.45	3.14
	6	JKRH-3333	4.81	7.30	1.92	2.74	4.12	3.33	3.06	3.90
	7	KRH-4	6.45	6.46	2.14	3.15	5.08	5.67	3.35	4.61
	8	SB.DHAN	2.76	3.91	1.78	2.71	3.52	2.00	3.60	2.90
	9	US-314	4.72	4.11	3.21	2.82	5.05	3.33	3.38	3.80
		T4 Mean	**4.46**	**5.44**	**2.53**	**2.80**	**4.42**	**3.22**	**3.30**	**3.74**
		Grand Mean	**5.10**	**4.92**	**2.67**	**3.36**	**5.13**	**4.12**	**3.98**	**4.18**
		LSD (Silicon)				0.02*				
		LSD (Center x Silicon)				0.44**				
		LSD (Variety)				0.27**				
		LSD (Center x Variety)				0.71**				
		LSD (Silicon x Variety)				NS				
		LSD (Center x Silicon x Variety)				1.42**				
		CV (%) Silicon				19.1				
		CV (%) Residual				21.14				

SB.Dhan= Sahabhagidhan

Table 6.1.7 Influence of Silica application on Shoot Weight (g/m2) maturity at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	1052	2045	665	1062	198	485	536	1523	668	481	553	559	819
	2	HRI-174	1063	3137	580	783	253	415	517	1430	743	482	593	551	879
	3	IIRRH-122	1055	2156	614	1080	164	551	612	975	925	432	603	575	812
	4	IIRRH-131	1046	2201	480	1116	121	550	542	1422	864	474	584	551	829
	5	IRRH-132	1076	2197	533	948	174	537	553	1115	715	457	575	492	781
	6	JKRH-3333	894	2442	563	819	126	514	563	1491	610	470	552	648	808
	7	KRH-4	1049	2768	650	960	200	544	622	1349	440	467	513	560	844
	8	SB.DHAN	942	1495	548	606	102	582	410	917	808	476	541	448	656
	9	US-314	893	2599	621	993	92	559	562	1287	815	445	575	586	835
		T1 Mean	**1008**	**2338**	**584**	**930**	**159**	**526**	**546**	**1279**	**732**	**465**	**565**	**552**	**807**
T2 (0.6% Silicon)	1	27P63	1199	2681	650	1107	148	464	600	1705	823	426	566	769	928
	2	HRI-174	1212	2856	603	1278	261	437	524	1848	694	446	666	706	961
	3	IIRRH-122	1203	2581	536	1149	134	540	677	1160	1158	437	631	641	904
	4	IIRRH-131	1193	2411	505	1467	125	547	638	1274	1057	467	585	620	907
	5	IRRH-132	1227	2358	547	900	164	551	529	1226	760	461	629	609	830
	6	JKRH-3333	1020	3320	580	1170	179	515	575	1682	733	467	562	723	960
	7	KRH-4	1196	3083	736	1227	237	544	659	1645	742	483	544	609	975
	8	SB.DHAN	1074	1443	575	933	130	588	506	815	670	431	532	506	684
	9	US-314	1019	2629	716	1233	106	563	491	1071	1292	449	562	709	903
		T2 Mean	**1149**	**2596**	**605**	**1163**	**165**	**528**	**578**	**1381**	**881**	**452**	**586**	**655**	**895**
T3 (water stress)	1	27P63	904	2133	613	1020	184	526	543	1416	811	435	491	570	804
	2	HRI-174	914	2030	615	1581	97	414	661	1197	1055	442	529	511	837
	3	IIRRH-122	908	2451	554	1374	120	486	768	824	1239	456	604	507	858
	4	IIRRH-131	900	1896	493	1551	147	537	629	1057	1190	467	469	500	820
	5	IRRH-132	926	2562	523	1094	111	548	579	779	1274	473	504	502	823
	6	JKRH-3333	769	3001	585	987	144	515	633	1287	1517	484	653	548	927
	7	KRH-4	902	3362	633	1137	160	537	756	847	1196	467	688	456	928
	8	SB.DHAN	810	1548	539	1113	141	589	389	1086	1250	452	601	471	749
	9	US-314	768	2367	601	981	64	550	537	1036	1152	494	486	580	801
		T3 Mean	**867**	**2372**	**573**	**1204**	**130**	**522**	**610**	**1059**	**1187**	**463**	**559**	**516**	**839**
T4 (water stress+silicon)	1	27P63	995	2610	639	1455	232	540	452	1244	549	474	467	432	841
	2	HRI-174	1006	2879	664	1821	145	396	494	899	539	458	518	439	855
	3	IIRRH-122	998	2105	658	1155	128	482	503	616	737	446	558	422	734
	4	IIRRH-131	990	2399	611	1428	110	514	497	664	666	447	472	420	768
	5	IRRH-132	1018	3089	628	1602	142	548	437	747	595	455	443	395	842
	6	JKRH-3333	846	2711	658	1305	107	484	463	1101	667	464	565	447	818
	7	KRH-4	992	2855	783	1287	118	480	522	749	971	453	621	382	851
	8	SB.DHAN	891	1387	596	1206	99	549	384	759	652	486	577	344	661
	9	US-314	842	2885	638	1224	174	549	398	914	842	466	476	441	821
		T4 Mean	**953**	**2547**	**653**	**1387**	**139**	**505**	**461**	**855**	**691**	**461**	**522**	**414**	**799**
		Grand Mean	**994**	**2463**	**604**	**1171**	**148**	**520**	**549**	**1143**	**873**	**460**	**558**	**534**	**835**
		LSD (Silicon)							NS						
		LSD (Center x Silicon)							333*						
		LSD (Variety)							NS						
		LSD (Center x Variety)							272						
		LSD (Silicon x Variety)							NS						
		LSD (Center x Silicon x Variety)							NS						
		CV (%) Silicon							35.5						
		CV (%) Residual							31						

SB.Dhan= Sahabhagidhan

Table 6.1.8 Influence of Silica application on Panicle Weight (g/m2) maturity at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	1133	1039	885	774	321	579	605	611	432	0	963	494	712
	2	HRI-174	1317	1003	839	675	623	573	698	637	652	0	937	495	768
	3	IIRRH-122	809	1130	888	867	290	551	646	609	689	0	720	498	700
	4	IIRRH-131	781	987	771	978	227	637	601	585	596	0	802	495	678
	5	IRRH-132	807	1254	845	873	461	600	655	652	757	0	809	443	741
	6	JKRH-3333	955	1071	864	942	402	585	612	569	539	0	723	545	710
	7	KRH-4	952	995	1049	879	592	542	733	621	489	0	894	503	750
	8	SB.DHAN	1013	782	849	660	132	699	614	516	574	0	670	403	628
	9	US-314	1485	946	1041	861	262	680	657	647	670	0	975	527	795
		T1 Mean	**1028**	**1023**	**892**	**834**	**368**	**605**	**647**	**605**	**600**	**0**	**832**	**489**	**720**
T2 (0.6% Silicon)	1	27P63	1083	1560	812	1026	352	564	589	695	510	0	1039	674	809
	2	HRI-174	1156	1107	875	780	624	552	749	686	432	0	1033	635	785
	3	IIRRH-122	598	1360	750	882	297	547	653	674	637	0	807	576	707
	4	IIRRH-131	734	1461	733	951	397	627	725	593	746	0	913	558	767
	5	IRRH-132	542	1730	859	843	640	612	731	708	603	0	900	548	792
	6	JKRH-3333	860	1908	831	915	451	613	685	651	715	0	824	651	827
	7	KRH-4	382	1386	976	795	623	579	780	688	549	0	982	547	753
	8	SB.DHAN	1012	1316	802	858	164	752	667	585	683	0	775	455	734
	9	US-314	1278	1590	984	765	283	728	808	695	850	0	1060	638	880
		T2 Mean	**849**	**1491**	**847**	**868**	**426**	**619**	**710**	**664**	**636**	**0**	**926**	**587**	**784**
T3 (water stress)	1	27P63	1396	1665	989	813	325	536	599	584	215	0	888	513	775
	2	HRI-174	971	1793	1034	813	469	525	642	536	230	0	845	459	756
	3	IIRRH-122	612	1521	891	846	192	493	532	576	257	0	758	456	649
	4	IIRRH-131	772	1187	846	828	250	501	653	543	250	0	815	450	645
	5	IRRH-132	978	1349	897	882	313	483	695	621	366	0	765	451	709
	6	JKRH-3333	1411	1770	904	747	298	496	592	529	113	0	658	494	728
	7	KRH-4	1178	1429	801	843	356	482	716	586	49	0	794	411	695
	8	SB.DHAN	677	982	860	3255	145	639	616	514	269	0	535	423	811
	9	US-314	889	1795	1102	870	207	617	734	597	299	0	920	522	778
		T3 Mean	**987**	**1499**	**925**	**1100**	**284**	**530**	**642**	**565**	**228**	**0**	**775**	**464**	**727**
T4 (water stress+silicon)	1	27P63	921	1181	1014	780	275	444	470	556	171	0	697	389	627
	2	HRI-174	905	1164	908	705	425	444	507	501	218	0	663	395	621
	3	IIRRH-122	477	987	1073	759	171	457	454	384	109	0	572	380	529
	4	IIRRH-131	732	944	828	870	211	457	579	502	153	0	565	378	565
	5	IRRH-132	473	1038	1010	678	339	444	571	549	122	0	590	355	561
	6	JKRH-3333	1739	1442	955	771	193	441	591	499	165	0	549	402	704
	7	KRH-4	914	1336	1034	801	478	429	591	517	120	0	654	344	656
	8	SB.DHAN	589	999	872	750	299	614	553	441	99	0	369	310	536
	9	US-314	1073	1001	960	909	245	537	611	569	70	0	694	397	642
		T4 Mean	**869**	**1121**	**962**	**780**	**293**	**474**	**547**	**502**	**136**	**0**	**595**	**372**	**605**
		Grand Mean	**933**	**1284**	**906**	**896**	**343**	**557**	**636**	**584**	**400**	**0**	**782**	**478**	**709**
		LSD (Silicon)							42.3**						
		LSD (Center x Silicon)							194**						
		LSD (Variety)							NS						
		LSD (Center x Variety)							240**						
		LSD (Silicon x Variety)							ns						
		LSD (Center x Silicon x Variety)							480**						
		CV (%) Silicon							31.5						
		CV (%) Residual							35.03						

SB.Dhan= Sahabhagidhan

Table 6.1.9 Influence of Silica application on Panicle Number/m2 maturity at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	339	187	343	258	250	418	283	225	207	201	175	126	251
	2	HRI-174	403	176	350	274	125	429	242	192	250	183	200	194	251
	3	IIRRH-122	342	242	367	222	217	429	263	258	290	227	233	179	272
	4	IIRRH-131	323	220	287	218	167	407	253	208	229	186	217	161	240
	5	IRRH-132	320	231	263	206	213	440	277	225	215	163	242	165	247
	6	JKRH-3333	322	176	260	260	208	484	233	175	220	178	217	131	239
	7	KRH-4	330	209	400	227	188	462	253	225	200	202	167	151	251
	8	SB.DHAN	332	165	393	244	200	451	225	225	251	217	217	138	255
	9	US-314	335	154	327	232	150	473	230	242	261	215	292	134	254
		T1 Mean	**339**	**196**	**332**	**238**	**191**	**444**	**251**	**219**	**236**	**197**	**218**	**153**	**251**
T2 (0.6% Silicon)	1	27P63	330	253	353	231	125	418	268	292	235	205	175	188	256
	2	HRI-174	342	242	310	229	175	451	263	242	262	246	225	209	266
	3	IIRRH-122	417	264	353	223	225	440	247	308	263	254	225	183	284
	4	IIRRH-131	345	264	283	272	188	429	267	242	244	265	217	178	266
	5	IRRH-132	309	275	317	263	263	462	270	325	207	222	208	186	276
	6	JKRH-3333	322	253	317	226	175	473	253	225	252	244	192	145	256
	7	KRH-4	322	253	377	224	213	451	292	292	246	255	275	200	283
	8	SB.DHAN	356	286	273	236	100	462	227	258	235	276	217	159	257
	9	US-314	408	209	427	253	183	473	218	242	295	256	300	151	285
		T2 Mean	**350**	**255**	**334**	**240**	**183**	**451**	**256**	**269**	**249**	**247**	**226**	**178**	**270**
T3 (water stress)	1	27P63	341	242	333	266	100	396	268	225	181	319	233	129	253
	2	HRI-174	422	253	343	297	300	451	262	175	230	263	200	187	282
	3	IIRRH-122	348	275	377	281	250	440	260	225	214	291	167	187	276
	4	IIRRH-131	339	198	367	264	175	429	272	208	246	307	183	170	263
	5	IRRH-132	335	242	343	268	263	440	262	192	203	284	217	172	268
	6	JKRH-3333	305	209	320	248	188	473	278	175	182	205	175	148	242
	7	KRH-4	345	220	280	275	275	440	328	208	222	278	208	189	273
	8	SB.DHAN	337	198	317	260	138	462	217	208	214	325	208	133	251
	9	US-314	359	220	387	278	138	484	262	225	219	244	200	129	262
		T3 Mean	**348**	**229**	**341**	**271**	**203**	**446**	**268**	**205**	**212**	**280**	**199**	**160**	**263**
T4 (water stress+silicon)	1	27P63	363	209	350	298	125	407	265	125	350	267	175	111	254
	2	HRI-174	353	209	340	243	200	440	240	142	460	243	158	156	265
	3	IIRRH-122	425	231	377	283	142	429	267	142	350	309	193	135	273
	4	IIRRH-131	347	220	250	277	192	407	268	108	341	291	258	132	258
	5	IRRH-132	338	231	337	302	188	440	238	92	382	226	217	138	261
	6	JKRH-3333	349	220	313	255	188	451	260	158	344	224	117	134	251
	7	KRH-4	357	231	390	303	138	451	275	125	348	261	175	145	267
	8	SB.DHAN	325	231	367	286	138	462	237	142	253	333	208	124	259
	9	US-314	439	187	307	316	142	495	222	142	273	235	192	132	257
		T4 Mean	**366**	**219**	**337**	**285**	**161**	**442**	**252**	**131**	**344**	**265**	**188**	**134**	**260**
		Grand Mean	**351**	**225**	**336**	**258**	**184**	**446**	**257**	**206**	**260**	**247**	**208**	**156**	**261**
		LSD (Silicon)						NS							
		LSD (Center x Silicon)						29.8**							
		LSD (Variety)						9.1*							
		LSD (Center x Variety)						41.5**							
		LSD (Silicon x Variety)						NS							
		LSD (Center x Silicon x Variety)						83.0**							
		CV (%) Silicon						15.9							
		CV (%) Residual						15.1							

SB.Dhan= Sahabhagidhan

Table 6.1.10 Influence of Silica application on Grain Number/Panicle at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	146	143	139	147	119	216	174	247	157	163	133	128	159
	2	HRI-174	67	140	87	150	137	200	130	248	136	159	136	205	150
	3	IIRRH-122	120	124	89	128	132	138	130	196	117	143	122	117	130
	4	IIRRH-131	130	130	120	134	120	155	148	258	108	144	128	148	144
	5	IRRH-132	92	143	122	156	147	153	126	204	256	145	123	115	148
	6	JKRH-3333	221	226	176	165	136	154	247	370	243	147	137	213	203
	7	KRH-4	146	157	112	154	179	174	168	317	136	159	126	174	167
	8	SB.DHAN	105	127	83	139	155	149	128	133	133	159	118	93	127
	9	US-314	119	177	131	145	91	161	178	239	89	161	143	118	146
		T1 Mean	**127**	**152**	**118**	**147**	**135**	**167**	**159**	**246**	**153**	**153**	**130**	**146**	**153**
T2 (0.6% Silicon)	1	27P63	168	164	123	131	111	211	185	337	87	130	149	142	162
	2	HRI-174	112	173	103	147	176	190	174	266	105	171	140	211	164
	3	IIRRH-122	90	117	78	131	136	135	118	240	130	153	129	123	132
	4	IIRRH-131	123	150	96	149	132	153	150	303	120	169	131	153	152
	5	IRRH-132	126	192	105	177	202	155	128	194	208	162	129	111	157
	6	JKRH-3333	186	211	137	177	154	159	278	397	170	177	132	211	199
	7	KRH-4	160	178	120	151	118	177	182	295	161	151	141	184	168
	8	SB.DHAN	83	114	109	146	162	162	130	219	117	131	121	95	132
	9	US-314	104	164	123	155	135	176	157	270	165	175	147	130	158
		T2 Mean	**128**	**163**	**111**	**152**	**147**	**169**	**167**	**280**	**141**	**158**	**135**	**151**	**158**
T3 (water stress)	1	27P63	175	142	159	122	120	177	151	241	188	163	131	128	158
	2	HRI-174	115	151	135	146	171	176	138	218	189	149	132	172	158
	3	IIRRH-122	96	119	111	121	115	128	98	134	59	171	112	99	114
	4	IIRRH-131	129	150	99	148	144	140	144	212	167	161	121	134	146
	5	IRRH-132	128	175	100	152	183	135	117	164	87	174	115	99	136
	6	JKRH-3333	198	247	147	127	164	140	173	347	178	154	131	187	183
	7	KRH-4	140	189	129	132	116	159	120	287	139	152	120	162	154
	8	SB.DHAN	36	119	105	117	158	146	149	107	282	164	113	96	133
	9	US-314	136	157	114	118	128	154	165	243	103	165	136	110	144
		T3 Mean	**128**	**161**	**122**	**131**	**144**	**151**	**139**	**217**	**155**	**161**	**123**	**132**	**147**
T4 (water stress+silicon)	1	27P63	98	181	156	124	104	158	148	235	82	151	127	124	141
	2	HRI-174	109	150	96	137	144	150	114	236	100	177	128	156	141
	3	IIRRH-122	64	117	102	130	134	115	82	167	42	158	110	87	109
	4	IIRRH-131	108	156	191	146	123	137	110	101	78	170	118	120	130
	5	IRRH-132	54	145	110	135	141	131	127	100	42	165	109	98	113
	6	JKRH-3333	206	234	164	132	120	122	164	193	61	179	124	170	156
	7	KRH-4	169	172	120	147	114	148	119	117	63	178	117	136	133
	8	SB.DHAN	69	109	90	136	140	138	112	81	41	166	100	97	107
	9	US-314	99	194	125	122	123	148	159	200	21	175	130	100	133
		T4 Mean	**108**	**162**	**128**	**134**	**127**	**139**	**126**	**159**	**59**	**169**	**118**	**121**	**129**
		Grand Mean	**123**	**159**	**120**	**141**	**138**	**156**	**148**	**225**	**127**	**160**	**127**	**137**	**147**
		LSD (Silicon)							4.4**						
		LSD (Center x Silicon)							15.1**						
		LSD (Variety)							7.72**						
		LSD (Center x Variety)							26.8**						
		LSD (Silicon x Variety)							Ns						
		LSD (Center x Silicon x Variety)							53.5**						
		CV (%) Silicon							14.3						
		CV (%) Residual							17.3						

SB.Dhan= Sahabhagidhan

Table 6.1.11 Influence of Silica application on Spikelet Number/panicle at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	164	155	187	0	150	232	249	270	199	104	146	143	182
	2	HRI-174	75	153	123	0	152	219	177	266	143	90	149	236	162
	3	IIRRH-122	134	135	120	0	146	155	186	228	159	93	135	138	148
	4	IIRRH-131	145	141	165	0	144	168	190	238	185	86	141	174	161
	5	IRRH-132	103	155	149	0	212	173	162	215	295	92	137	140	167
	6	JKRH-3333	248	241	224	0	181	172	305	403	262	96	153	237	229
	7	KRH-4	164	169	151	0	226	189	213	349	136	94	139	214	186
	8	SB.DHAN	117	138	107	0	177	163	140	145	190	100	129	108	138
	9	US-314	134	188	171	0	122	177	196	273	114	107	163	144	163
		T1 Mean	**143**	**164**	**155**	**0**	**167**	**183**	**202**	**265**	**187**	**96**	**144**	**171**	**171**
T2 (0.6% Silicon)	1	27P63	188	176	163	0	153	232	245	358	106	88	161	160	185
	2	HRI-174	125	185	144	0	231	215	214	282	112	106	152	246	183
	3	IIRRH-122	101	129	106	0	152	154	157	271	205	105	141	140	151
	4	IIRRH-131	138	161	131	0	193	167	196	329	149	98	142	168	170
	5	IRRH-132	141	206	147	0	263	175	163	213	233	99	142	130	174
	6	JKRH-3333	209	227	183	0	188	174	341	419	197	111	147	247	222
	7	KRH-4	179	191	159	0	136	193	237	361	152	102	158	217	190
	8	SB.DHAN	93	125	142	0	170	176	142	230	146	96	132	115	142
	9	US-314	117	175	186	0	159	195	177	295	196	103	168	156	175
		T2 Mean	**143**	**175**	**151**	**0**	**183**	**187**	**208**	**306**	**166**	**101**	**149**	**175**	**177**
T3 (water stress)	1	27P63	196	153	200	0	160	211	216	283	252	110	144	144	188
	2	HRI-174	128	164	192	0	201	206	195	269	233	102	143	216	186
	3	IIRRH-122	108	131	151	0	152	152	165	241	96	111	123	127	142
	4	IIRRH-131	145	162	139	0	218	156	199	264	280	115	131	169	180
	5	IRRH-132	143	187	139	0	254	161	175	218	167	100	127	124	163
	6	JKRH-3333	221	262	190	0	208	166	262	393	224	87	144	231	217
	7	KRH-4	157	202	189	0	170	179	182	316	225	101	135	199	187
	8	SB.DHAN	40	130	126	0	186	167	177	116	348	108	124	113	148
	9	US-314	152	168	168	0	143	176	197	265	140	109	151	131	164
		T3 Mean	**143**	**173**	**166**	**0**	**188**	**175**	**197**	**263**	**218**	**105**	**136**	**162**	**175**
T4 (water stress+silicon)	1	27P63	110	193	203	0	160	214	212	251	107	99	142	137	166
	2	HRI-174	123	163	164	0	217	188	170	256	115	110	142	191	167
	3	IIRRH-122	72	129	129	0	180	149	143	265	75	94	124	118	134
	4	IIRRH-131	121	168	260	0	209	154	169	153	119	111	136	145	159
	5	IRRH-132	60	156	134	0	172	160	181	112	83	107	127	121	128
	6	JKRH-3333	230	251	229	0	182	152	233	209	118	112	134	209	187
	7	KRH-4	189	185	172	0	177	170	187	149	81	117	132	191	159
	8	SB.DHAN	77	119	123	0	168	163	138	105	61	115	118	115	118
	9	US-314	111	206	157	0	158	177	193	222	57	97	145	126	150
		T4 Mean	**121**	**174**	**175**	**0**	**180**	**170**	**181**	**191**	**91**	**107**	**133**	**150**	**152**
		Grand Mean	**138**	**172**	**162**	**0**	**179**	**179**	**197**	**256**	**166**	**102**	**140**	**164**	**169**
		LSD (Silicon)							4.3*						
		LSD (Center x Silicon)							15.1**						
		LSD (Variety)							9.09**						
		LSD (Center x Variety)							31.4**						
		LSD (Silicon x Variety)							ns						
		LSD (Center x Silicon x Variety)							62.8**						
		CV (%) Silicon							13.6						
		CV (%) Residual							19.3						

SB.Dhan= Sahabhagidhan

Table 6.1.12 Influence of Silica application on Grain Number/m2 at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	49436	26829	47800	0	29750	90200	49332	55500	30747	32712	23350	16025	41062
	2	HRI-174	26852	24860	30507	0	17063	85393	31331	47533	36529	29631	27267	39823	36072
	3	IIRRH-122	40898	29524	32144	0	28167	58971	33925	50417	33514	33043	28400	20992	35454
	4	IIRRH-131	41903	28468	33169	0	20200	62656	37594	53725	24612	27484	27700	23791	34664
	5	IRRH-132	29365	33033	32200	0	30513	67177	34936	45825	52157	23471	29842	18916	36130
	6	JKRH-3333	71197	39523	45667	0	28633	74283	57724	64808	45101	26153	29733	27800	46420
	7	KRH-4	48167	33264	45021	0	33342	80366	42916	71250	29209	31473	20867	26416	42026
	8	SB.DHAN	34827	20900	32656	0	30933	66946	28955	29925	37408	34775	25575	12821	32338
	9	US-314	39988	27522	42570	0	14475	76318	41320	57967	23422	34908	41692	15739	37811
		T1 Mean	**42515**	**29325**	**37970**	**0**	**25897**	**73590**	**39781**	**52994**	**34744**	**30406**	**28269**	**22480**	**37998**
T2 (0.6% Silicon)	1	27P63	55450	40579	43580	0	13875	88198	49660	98233	22810	27072	26117	27039	44783
	2	HRI-174	38225	41800	31976	0	30442	85602	45784	64092	28201	42661	31533	44222	44049
	3	IIRRH-122	37576	30888	27322	0	29333	59620	29063	73933	34295	39385	28867	22526	37528
	4	IIRRH-131	42408	39732	27254	0	24758	65560	40072	73250	29735	45023	28500	27328	40329
	5	IRRH-132	38894	52459	33249	0	52571	71874	34389	63158	43249	36173	26783	20548	43032
	6	JKRH-3333	59933	52723	43642	0	26450	75702	70326	89400	42487	43179	25267	30661	50888
	7	KRH-4	51626	44550	45267	0	24073	79684	53312	85925	34556	38513	38717	36671	48445
	8	SB.DHAN	29618	32560	29031	0	16150	74767	29362	56492	35387	36667	26217	15185	34676
	9	US-314	42463	33935	52371	0	28092	83248	34461	65233	50458	44774	44608	19529	45379
		T2 Mean	**44022**	**41025**	**37077**	**0**	**27305**	**76028**	**42937**	**74413**	**35686**	**39272**	**30734**	**27079**	**43234**
T3 (water stress)	1	27P63	59506	34078	52833	0	11792	70235	40240	54425	32444	52234	30542	16429	41342
	2	HRI-174	48346	37983	46258	0	51050	79816	35987	38092	42660	38947	26442	32083	43424
	3	IIRRH-122	33496	32802	41763	0	28925	56540	25724	30150	12162	48932	18533	18498	31593
	4	IIRRH-131	43734	29766	36298	0	25504	60313	38352	44283	41691	48672	22108	22867	37599
	5	IRRH-132	42865	42537	34371	0	47927	59510	30526	31375	17974	49316	24908	17001	36210
	6	JKRH-3333	60309	51964	46954	0	29775	65934	47979	60783	31237	31850	22917	27476	43380
	7	KRH-4	48514	41558	36449	0	31446	69971	39412	59600	31055	42045	24992	30460	41409
	8	SB.DHAN	12096	23562	33563	0	21635	67452	32387	22358	60753	53371	23333	12684	33018
	9	US-314	48646	34958	43720	0	17969	74624	42910	54950	23589	40274	27300	14157	38463
		T3 Mean	**44168**	**36579**	**41356**	**0**	**29558**	**67155**	**37057**	**44002**	**32618**	**45071**	**24564**	**21295**	**38493**
T4 (water stress+silicon)	1	27P63	35544	37895	53923	0	13133	64482	39048	29417	29781	40221	22067	13683	34472
	2	HRI-174	38639	31031	32346	0	28775	66550	27192	33475	44950	42858	20317	24343	35498
	3	IIRRH-122	27159	27005	38299	0	18733	49412	21929	23592	13557	50528	21247	11657	27556
	4	IIRRH-131	37364	34804	34209	0	23517	55605	29609	10967	28331	51420	30350	15756	31994
	5	IRRH-132	18237	33418	37114	0	26396	57805	30477	9342	16871	37641	23617	13543	27678
	6	JKRH-3333	71796	51403	51425	0	22238	55154	42514	30767	26709	39619	14350	22703	38971
	7	KRH-4	60051	39853	46782	0	15675	66726	32800	14667	23435	46657	20400	19604	35150
	8	SB.DHAN	22297	25179	32851	0	19100	63811	26368	11442	10508	55315	21000	12002	27261
	9	US-314	43387	36124	38152	0	17342	73260	35216	28492	5938	41176	24808	13145	32458
		T4 Mean	**39386**	**35190**	**40567**	**0**	**20545**	**61423**	**31684**	**21351**	**22231**	**45048**	**22017**	**16271**	**32338**
		Grand Mean	**42523**	**35530**	**39243**	**0**	**25826**	**69549**	**37865**	**48190**	**31320**	**39949**	**26396**	**21781**	**38016**
		LSD (Silicon)							1103*						
		LSD (Center x Silicon)							5072**						
		LSD (Variety)							2182**						
		LSD (Center x Variety)							7559**						
		LSD (Silicon x Variety)							NS						
		LSD (Center x Silicon x Variety)							15118**						
		CV (%) Silicon							20.21						
		CV (%) Residual							20.58						

SB.Dhan= Sahabhagidhan

Table 6.1.13 Influence of Silica application on Spikelet Number/m2 at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	55369	2200	64146	0	3750	97119	70582	60750	39972	20747	25567	17930	41648
	2	HRI-174	30074	2167	43195	0	3788	93676	42539	51083	37964	16493	29800	45929	36064
	3	IIRRH-122	45805	2728	43642	0	3638	66429	49194	59000	45547	21092	31517	24661	35750
	4	IIRRH-131	46343	2420	46234	0	3588	68068	48328	49492	43426	16037	30450	28042	34766
	5	IRRH-132	33312	2772	39273	0	5288	75636	44886	48300	59981	14940	33300	23147	34621
	6	JKRH-3333	79741	2772	58327	0	4513	83171	71329	70525	52000	16976	33267	30938	45778
	7	KRH-4	53947	2662	60567	0	5642	87527	54116	78450	31582	18885	23083	32599	40824
	8	SB.DHAN	39006	1870	42250	0	4425	73194	31514	32550	50005	21869	28025	14911	30874
	9	US-314	44787	1694	55247	0	3042	83897	45494	65900	29965	23134	47583	19274	38183
		T1 Mean	**47598**	**2365**	**50320**	**0**	**4186**	**80969**	**50887**	**57339**	**43382**	**18908**	**31399**	**26381**	**37612**
T2 (0.6% Sidslicon)	1	27P63	62105	3036	57459	0	3825	96965	65784	104417	22613	18361	28250	30463	44843
	2	HRI-174	42812	2827	44355	0	5763	96712	56276	68258	21545	26361	34317	51547	40979
	3	IIRRH-122	42086	3080	36688	0	3788	67980	38924	83583	42189	27529	31633	25709	36654
	4	IIRRH-131	47497	3003	37137	0	4813	71445	52275	79500	36627	25940	30883	30053	38107
	5	IRRH-132	43562	3641	46021	0	6575	81312	43863	69225	46523	25128	29442	24043	38121
	6	JKRH-3333	67124	3993	58049	0	4700	82863	86419	94275	37632	26745	28142	35881	47802
	7	KRH-4	57821	3234	59766	0	3400	87021	69628	105458	44532	25876	43458	43266	49405
	8	SB.DHAN	33172	3047	37767	0	4238	81246	32253	59442	44164	27227	28600	18516	33606
	9	US-314	47558	2376	79039	0	3963	92257	38797	71200	47858	26161	50700	23472	43944
		T2 Mean	**49304**	**3137**	**50698**	**0**	**4563**	**84200**	**53802**	**81706**	**38187**	**25481**	**33936**	**31439**	**41496**
T3 (water stress)	1	27P63	66646	2750	66648	0	3996	83622	57648	63592	43903	35223	33592	18534	43287
	2	HRI-174	54147	3190	65927	0	5013	93291	51174	47075	52720	26728	28717	40340	42575
	3	IIRRH-122	37515	3311	56683	0	3800	66935	43206	54225	20336	32200	20317	23776	32937
	4	IIRRH-131	48982	2376	51279	0	5438	66880	53568	55125	68537	35482	24031	28769	40042
	5	IRRH-132	48009	2827	47513	0	6338	70928	45673	41858	34658	28492	27533	21275	34100
	6	JKRH-3333	67546	3300	60579	0	5200	78496	72958	68717	39760	17682	25181	34005	43039
	7	KRH-4	54335	2860	52946	0	4246	78771	59560	65792	50073	28847	27983	37525	42085
	8	SB.DHAN	13548	2112	39815	0	4638	77154	38416	24258	74773	41127	25653	14945	32404
	9	US-314	54484	2343	63119	0	3563	85096	51484	59717	31927	26626	30350	16913	38693
		T3 Mean	**49468**	**2785**	**56057**	**0**	**4692**	**77908**	**52632**	**53373**	**46299**	**30267**	**27040**	**26231**	**38796**
T4 (water stress+silicon)	1	27P63	39810	2574	70467	0	4000	87527	56128	31417	38491	26273	24783	15236	36064
	2	HRI-174	43275	2728	55676	0	5417	83336	40813	36300	52168	27433	22433	29745	36302
	3	IIRRH-122	30418	2772	48360	0	4488	64262	37965	37600	24825	28922	23959	15914	29044
	4	IIRRH-131	41847	2640	47279	0	5213	62557	45241	16608	42619	33091	35100	19022	31929
	5	IRRH-132	20426	2541	45047	0	4308	70279	43324	10075	33535	24511	27533	16609	27108
	6	JKRH-3333	80412	3674	71737	0	4542	68530	60338	33050	49066	25030	15567	27912	39987
	7	KRH-4	67257	3014	66855	0	4425	76813	51189	18583	29436	30163	22992	27559	36208
	8	SB.DHAN	24973	2464	44770	0	4200	75009	32513	14942	15136	38974	24767	14760	26592
	9	US-314	48593	2244	47855	0	3958	87879	42466	31342	16345	22868	27683	16548	31617
		T4 Mean	**44112**	**2739**	**55338**	**0**	**4506**	**75132**	**45553**	**25546**	**33513**	**28585**	**24980**	**20583**	**32781**
		Grand Mean	**47621**	**2757**	**53103**	**0**	**4486**	**79552**	**50719**	**54491**	**40345**	**25810**	**29339**	**26211**	**37676**
		LSD (Silicon)							NS						
		LSD (Center x Silicon)							5807**						
		LSD (Variety)							2417**						
		LSD (Center x Variety)							8373**						
		LSD (Silicon x Variety)							NS						
		LSD (Center x Silicon x Variety)							16748**						
		CV (%) Silicon							23.3						
		CV (%) Residual							23.01						

SB.Dhan= Sahabhagidhan

Table 6.1.14 Influence of Silica application on Total Dry Matter (g/m2) maturity at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	1331	0	1551	1410	2622	979	1141	2133	1100	683	1588	1063	1418
	2	HRI-174	1346	0	1419	1506	2689	864	1215	2067	1394	664	1641	1047	1441
	3	IIRRH-122	1336	0	1503	1548	2089	1076	1259	1583	1614	659	1600	1092	1396
	4	IIRRH-131	1324	0	1251	1452	2333	1124	1143	2007	1460	661	1457	1046	1387
	5	IRRH-132	1362	0	1378	1746	2244	1122	1208	1767	1472	620	1496	934	1395
	6	JKRH-3333	1132	0	1427	1377	2067	1012	1175	2060	1148	648	1526	1232	1346
	7	KRH-4	1328	0	1699	1197	2222	1067	1355	1970	929	670	1726	1063	1384
	8	SB.DHAN	1193	0	1397	1728	1333	1192	1024	1433	1382	693	1339	850	1233
	9	US-314	1132	0	1662	1683	1622	1153	1218	1933	1485	661	1615	1113	1389
		T1 Mean	**1276**	**0**	**1476**	**1516**	**2136**	**1065**	**1193**	**1884**	**1332**	**662**	**1554**	**1049**	**1377**
T2 (0.6% Silicon)	1	27P63	1518	0	1462	1801	2833	945	1189	2400	1333	631	1798	1461	1579
	2	HRI-174	1534	0	1478	1686	2756	874	1273	2533	1126	692	1906	1342	1564
	3	IIRRH-122	1523	0	1287	2121	2711	1080	1330	1833	1795	691	1665	1217	1569
	4	IIRRH-131	1510	0	1238	1683	2378	1136	1363	1867	1803	732	1685	1178	1507
	5	IRRH-132	1553	0	1405	1809	2333	1144	1259	1933	1363	684	1729	1157	1488
	6	JKRH-3333	1291	0	1410	1638	2133	1017	1260	2333	1448	711	1580	1374	1472
	7	KRH-4	1513	0	1712	1539	2333	1079	1439	2333	1291	738	1766	1157	1536
	8	SB.DHAN	1359	0	1377	1935	1467	1217	1173	1400	1353	708	1480	961	1312
	9	US-314	1291	0	1700	1956	1644	1172	1300	1767	2141	705	1791	1347	1529
		T2 Mean	**1455**	**0**	**1452**	**1797**	**2288**	**1074**	**1287**	**2044**	**1517**	**699**	**1711**	**1244**	**1506**
T3 (water stress)	1	27P63	1145	0	1601	1677	2800	959	1142	2000	1027	753	1552	1084	1431
	2	HRI-174	1157	0	1649	1410	2789	811	1303	1733	1286	705	1553	970	1397
	3	IIRRH-122	1149	0	1445	1614	2622	946	1300	1400	1497	747	1568	963	1386
	4	IIRRH-131	1139	0	1340	1578	2267	1028	1282	1600	1403	774	1443	950	1346
	5	IRRH-132	1172	0	1420	2265	2267	1092	1274	1400	1682	757	1416	953	1427
	6	JKRH-3333	974	0	1489	1476	2422	951	1224	1817	1630	689	1497	1042	1383
	7	KRH-4	1142	0	1434	1260	2178	1041	1472	1433	1245	745	1678	866	1318
	8	SB.DHAN	1026	0	1398	1818	1244	1156	1005	1600	1541	776	1321	895	1253
	9	US-314	974	0	1703	1761	1489	1118	1270	1633	1451	738	1561	1103	1346
		T3 Mean	**1097**	**0**	**1498**	**1651**	**2231**	**1011**	**1253**	**1624**	**1418**	**743**	**1510**	**981**	**1365**
T4 (water stress+silicon)	1	27P63	1259	0	1653	2022	2800	957	922	1800	720	741	1300	822	1363
	2	HRI-174	1273	0	1572	1410	2689	762	1001	1400	757	701	1287	834	1244
	3	IIRRH-122	1264	0	1731	1692	2622	915	957	1000	846	755	1311	802	1263
	4	IIRRH-131	1253	0	1438	1880	2044	985	1076	1167	819	738	1183	798	1216
	5	IRRH-132	1289	0	1638	2366	2000	1078	1009	1297	718	680	1162	750	1271
	6	JKRH-3333	1071	0	1613	1413	2560	876	1054	1600	832	688	1215	849	1252
	7	KRH-4	1256	0	1817	1893	2133	957	1112	1267	1091	713	1411	726	1307
	8	SB.DHAN	1128	0	1468	1539	1156	1089	937	1200	751	819	1057	654	1073
	9	US-314	1071	0	1597	1542	1444	1090	1009	1483	912	701	1309	838	1182
		T4 Mean	**1207**	**0**	**1614**	**1751**	**2161**	**968**	**1009**	**1357**	**827**	**726**	**1248**	**786**	**1241**
		Grand Mean	**1259**	**0**	**1510**	**1679**	**2204**	**1030**	**1185**	**1727**	**1273**	**708**	**1506**	**1015**	**1372**
		LSD (Silicon)						87.9**							
		LSD (Center x Silicon)						304**							
		LSD (Variety)						NS							
		LSD (Center x Variety)						181.9**							
		LSD (Silicon x Variety)						ns							
		LSD (Center x Silicon x Variety)						363**							
		CV (%) Silicon						23.6							
		CV (%) Residual						13.7							

SB.Dhan= Sahabhagidhan

Table 6.1.15 Influence of Silica application on Grain Yield (g/m2) at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	510	4479	763	744	467	495	412	613	362	296	863	470	873
	2	HRI-174	588	5313	723	754	644	449	524	630	511	255	854	473	977
	3	IIRRH-122	548	4896	783	619	644	526	524	536	550	290	623	417	913
	4	IIRRH-131	594	4635	674	794	444	574	488	457	480	265	725	423	880
	5	IRRH-132	815	5104	750	800	578	584	537	641	629	160	713	401	976
	6	JKRH-3333	576	4479	769	712	578	498	446	530	411	243	618	520	865
	7	KRH-4	750	4844	914	663	489	523	543	618	379	213	766	468	931
	8	SB.DHAN	499	4792	751	865	378	610	484	515	445	249	577	349	876
	9	US-314	658	4583	916	840	422	594	575	575	555	231	883	495	944
		T1 Mean	**615**	**4792**	**783**	**754**	**516**	**539**	**504**	**568**	**480**	**245**	**736**	**446**	**915**
T2 (0.6% Silicon)	1	27P63	534	5417	698	791	511	481	490	619	429	279	995	555	983
	2	HRI-174	615	5104	746	863	656	437	572	673	329	237	989	483	975
	3	IIRRH-122	574	5260	652	964	667	540	536	522	521	261	747	439	974
	4	IIRRH-131	621	4167	627	861	489	589	624	535	613	314	858	439	895
	5	IRRH-132	852	5625	765	979	711	592	591	706	506	213	845	431	1068
	6	JKRH-3333	602	4531	724	788	600	502	538	610	561	367	754	561	928
	7	KRH-4	785	4583	861	766	511	535	583	666	595	201	908	497	958
	8	SB.DHAN	522	4792	699	756	356	630	553	558	525	249	703	375	893
	9	US-314	688	6146	810	854	467	609	632	671	706	213	1014	534	1112
		T2 Mean	**644**	**5069**	**731**	**847**	**552**	**546**	**569**	**618**	**532**	**259**	**868**	**479**	**976**
T3 (water stress)	1	27P63	444	5417	865	709	489	433	417	559	187	332	824	350	919
	2	HRI-174	512	4479	883	693	622	396	487	530	150	290	809	338	849
	3	IIRRH-122	477	4271	779	751	644	460	399	461	214	249	571	374	804
	4	IIRRH-131	517	4115	728	775	556	492	496	523	188	320	685	329	810
	5	IRRH-132	709	5208	780	629	556	544	512	592	243	237	671	347	919
	6	JKRH-3333	501	4896	793	650	567	436	455	524	185	332	573	368	857
	7	KRH-4	653	4531	673	591	533	504	547	535	173	237	714	281	831
	8	SB.DHAN	434	4479	779	596	356	567	471	483	204	279	419	366	786
	9	US-314	573	6146	956	756	444	568	594	558	231	279	842	400	1029
		T3 Mean	**535**	**4838**	**804**	**683**	**530**	**489**	**487**	**530**	**197**	**284**	**679**	**350**	**867**
T4 (water stress+silicon)	1	27P63	486	4896	886	593	533	417	385	487	183	338	668	331	850
	2	HRI-174	560	4167	740	662	622	366	362	425	204	279	652	282	777
	3	IIRRH-122	522	4792	956	623	644	433	293	359	141	320	423	264	814
	4	IIRRH-131	565	3646	714	662	411	471	418	400	244	302	539	262	720
	5	IRRH-132	775	4583	905	691	533	530	421	528	166	178	525	247	840
	6	JKRH-3333	548	4531	827	562	489	392	437	479	244	379	441	276	800
	7	KRH-4	714	4792	880	478	467	477	446	433	201	237	566	251	828
	8	SB.DHAN	492	3958	761	747	291	540	410	438	142	267	298	271	718
	9	US-314	627	5104	850	632	389	542	453	492	80	296	704	375	879
		T4 Mean	**588**	**4497**	**836**	**628**	**487**	**463**	**403**	**449**	**178**	**288**	**535**	**284**	**803**
		Grand Mean	**596**	**4799**	**788**	**728**	**521**	**509**	**490**	**541**	**347**	**269**	**704**	**390**	**890**
		LSD (Silicon)						59.0**							
		LSD (Center x Silicon)						204**							
		LSD (Variety)						47.5*							
		LSD (Center x Variety)						216**							
		LSD (Silicon x Variety)						ns							
		LSD (Center x Silicon x Variety)						ns							
		CV (%) Silicon						31.9							
		CV (%) Residual						23.1							

SB.Dhan= Sahabhagidhan

Table 6.1.16 Influence of Silica application on 1000 Grain weight (g) at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	16.8	17.8	16.0	18.8	14.1	17.5	17.0	17.8	25.0	22.2	17.1	22.9	18.6
	2	HRI-174	23.3	26.2	23.7	25.8	15.2	22.1	23.6	25.2	21.3	21.4	18.1	17.8	22.0
	3	IIRRH-122	21.1	25.7	24.4	25.6	14.3	22.3	24.2	24.1	25.0	21.9	21.5	20.9	22.6
	4	IIRRH-131	17.5	20.8	20.3	23.7	13.7	21.0	20.0	20.3	23.3	25.2	18.5	22.4	20.6
	5	IRRH-132	22.1	24.5	23.3	26.0	16.8	21.9	22.0	22.4	19.0	22.8	21.1	18.5	21.7
	6	JKRH-3333	18.2	18.2	16.8	25.1	16.7	16.6	17.0	17.8	17.3	21.1	18.6	22.3	18.8
	7	KRH-4	20.3	19.0	20.5	21.5	17.7	20.2	19.1	19.6	18.7	22.1	22.4	21.2	20.2
	8	SB.DHAN	23.6	25.7	23.0	25.5	19.7	21.2	22.8	23.6	23.3	22.0	21.9	16.0	22.4
	9	US-314	28.0	23.5	21.5	21.5	17.5	21.5	20.9	22.3	21.7	21.8	22.7	21.1	22.0
		T1 Mean	**21.2**	**22.4**	**21.1**	**23.7**	**16.2**	**20.5**	**20.7**	**21.5**	**21.6**	**22.3**	**20.2**	**20.3**	**21.0**
T2 (0.6% Silicon)	1	27P63	11.6	19.7	16.0	19.3	14.5	17.4	16.2	18.6	22.0	22.1	18.0	22.9	18.2
	2	HRI-174	18.8	23.0	23.3	25.7	18.2	22.9	23.1	27.6	22.7	18.5	19.8	18.3	21.8
	3	IIRRH-122	19.2	26.8	23.8	25.9	14.6	22.8	23.4	25.0	32.7	23.7	23.3	21.0	23.5
	4	IIRRH-131	20.2	20.2	23.0	23.4	19.4	21.2	20.8	21.2	25.7	19.5	18.2	23.2	21.3
	5	IRRH-132	20.5	23.8	23.0	26.1	17.2	22.0	22.3	23.0	20.7	21.4	23.1	18.8	21.8
	6	JKRH-3333	13.7	20.5	16.6	25.0	18.0	16.5	16.3	22.3	20.3	19.3	20.2	22.2	19.2
	7	KRH-4	16.0	19.8	19.0	20.8	16.4	20.6	18.7	21.3	20.3	25.9	24.7	21.9	20.4
	8	SB.DHAN	19.2	25.0	24.1	25.5	23.3	22.1	23.2	23.8	22.7	25.4	23.2	16.1	22.8
	9	US-314	21.7	24.5	15.4	18.2	14.9	22.2	21.7	22.8	25.0	22.3	24.2	21.9	21.2
		T2 Mean	**17.9**	**22.6**	**20.5**	**23.3**	**17.4**	**20.8**	**20.6**	**22.8**	**23.6**	**22.0**	**21.6**	**20.7**	**21.2**
T3 (water stress)	1	27P63	40.1	20.3	16.4	19.2	14.4	16.3	16.0	17.6	13.7	20.9	16.3	22.8	19.5
	2	HRI-174	22.5	21.2	19.1	26.3	17.4	21.0	22.5	24.0	20.0	22.4	16.3	18.3	20.9
	3	IIRRH-122	17.2	24.5	18.6	25.0	15.0	21.2	22.8	24.4	14.0	20.4	19.9	21.0	20.3
	4	IIRRH-131	22.2	19.2	20.0	22.9	13.6	19.2	19.9	20.6	22.3	22.4	16.0	22.6	20.1
	5	IRRH-132	28.5	24.0	22.7	26.0	21.0	19.7	22.2	22.2	16.0	23.8	20.1	18.6	22.1
	6	JKRH-3333	45.1	19.0	16.9	24.7	16.1	15.5	16.3	18.1	15.7	25.0	17.4	22.4	21.0
	7	KRH-4	33.3	20.5	18.5	20.5	21.6	19.2	17.8	18.8	16.7	25.2	21.0	21.8	21.2
	8	SB.DHAN	19.7	25.8	23.3	25.7	18.9	19.6	23.0	23.4	19.3	20.7	20.6	15.3	21.3
	9	US-314	24.2	23.7	21.9	19.5	14.8	19.9	22.4	22.0	13.3	23.1	21.1	21.8	20.6
		T3 Mean	**28.1**	**22.0**	**19.7**	**23.3**	**17.0**	**19.1**	**20.3**	**21.2**	**16.8**	**22.7**	**18.7**	**20.5**	**20.8**
T4 (water stress+silicon)	1	27P63	16.0	20.3	16.4	19.2	14.1	15.5	15.2	16.6	12.3	21.0	14.7	19.9	16.8
	2	HRI-174	21.9	26.2	22.9	25.4	15.0	20.1	21.8	22.3	14.0	20.7	15.8	17.0	20.3
	3	IIRRH-122	21.0	27.8	25.0	25.4	13.4	19.6	22.5	23.4	9.3	21.4	18.7	19.8	20.6
	4	IIRRH-131	17.2	23.2	20.9	22.7	11.1	18.7	21.0	19.1	11.7	19.1	14.6	20.0	18.3
	5	IRRH-132	14.4	26.3	24.4	25.9	15.9	18.9	23.7	20.8	8.0	20.9	17.2	17.2	19.5
	6	JKRH-3333	16.1	18.8	16.1	25.7	14.1	15.0	16.4	17.0	13.7	21.7	16.1	21.7	17.7
	7	KRH-4	10.6	20.8	18.8	20.3	17.3	18.7	18.3	16.3	11.0	26.2	17.1	20.0	17.9
	8	SB.DHAN	22.7	26.7	23.2	25.9	19.7	18.6	22.6	23.2	11.0	19.4	18.4	15.5	20.6
	9	US-314	18.5	24.0	22.3	19.2	19.0	19.3	21.8	21.2	8.7	23.0	18.8	20.0	19.7
		T4 Mean	**17.6**	**23.8**	**21.1**	**23.3**	**15.5**	**18.3**	**20.4**	**20.0**	**11.1**	**21.5**	**16.8**	**19.0**	**19.0**
		Grand Mean	**21.2**	**22.7**	**20.6**	**23.4**	**16.5**	**19.7**	**20.5**	**21.4**	**18.3**	**22.1**	**19.4**	**20.1**	**20.5**
		LSD (Silicon)							NS						
		LSD (Center x Silicon)							1.57**						
		LSD (Variety)							0.605**						
		LSD (Center x Variety)							2.118**						
		LSD (Silicon x Variety)							NS						
		LSD (Center x Silicon x Variety)							4.23**						
		CV (%) Silicon							10.6						
		CV (%) Residual							9.78						

SB.Dhan= Sahabhagidhan

Table 6.1.17 Influence of Silica application on Harvest Index (%) at different centres Kharif 2019

Treat.	S.No.	Genotypes	CBT	CHN	IIRR	KJT	KRK	MTU	NRRI	PNR	PTB	RANCHI	REWA	TTB	Grand Mean
T1 (Control)	1	27P63	37.7	45.7	49.1	44.4	17.9	50.6	36.1	28.8	32.9	43.5	54.0	44.4	40.4
	2	HRI-174	43.3	45.0	51.0	46.5	24.0	51.9	43.1	30.6	36.5	38.6	53.7	45.3	42.5
	3	IIRRH-122	40.7	48.7	52.2	45.5	29.4	48.8	41.5	33.9	34.9	44.1	38.8	38.2	41.3
	4	IIRRH-131	44.7	47.1	53.6	44.4	18.7	51.0	42.8	22.8	33.5	40.1	49.4	40.6	40.7
	5	IRRH-132	59.7	45.1	54.3	43.5	25.8	51.9	44.5	36.3	43.3	25.8	49.2	43.1	43.5
	6	JKRH-3333	50.3	43.9	53.7	44.4	28.9	49.2	38.1	25.8	35.6	37.4	40.2	42.3	40.8
	7	KRH-4	56.3	48.1	53.8	45.4	22.4	49.0	40.1	31.4	40.2	31.7	44.4	44.1	42.2
	8	SB.DHAN	41.7	45.1	53.8	45.5	28.5	51.2	47.3	36.0	32.0	35.9	42.4	41.2	41.7
	9	US-314	57.7	42.6	55.1	45.5	26.0	51.5	47.2	29.8	37.7	35.1	55.2	44.7	44.0
		T1 Mean	**48.0**	**45.7**	**53.0**	**45.0**	**24.6**	**50.6**	**42.3**	**30.6**	**36.3**	**36.9**	**47.5**	**42.6**	**41.9**
T2 (0.6% Silicon)	1	27P63	35.0	48.6	47.6	44.4	18.0	51.0	41.2	25.8	33.0	44.7	55.4	38.0	40.2
	2	HRI-174	39.7	47.1	50.5	46.5	23.9	50.0	44.9	26.6	26.6	34.3	51.9	36.0	39.8
	3	IIRRH-122	37.3	47.4	50.3	45.5	24.3	50.0	40.1	28.5	28.6	38.3	44.9	36.1	39.3
	4	IIRRH-131	40.7	46.4	50.7	44.4	20.7	51.8	45.8	28.7	34.0	42.7	50.9	37.4	41.2
	5	IRRH-132	54.3	44.2	54.2	43.5	30.4	51.8	46.9	36.6	34.0	31.0	48.9	37.6	42.8
	6	JKRH-3333	46.3	44.9	51.1	44.4	30.2	49.4	42.6	26.2	36.1	51.8	47.7	40.8	42.6
	7	KRH-4	51.3	46.7	50.3	45.5	22.5	49.6	40.5	28.6	46.2	27.3	51.4	43.1	41.9
	8	SB.DHAN	37.7	48.5	50.3	45.5	24.2	51.7	47.1	39.8	38.9	35.5	47.5	39.0	42.1
	9	US-314	53.0	46.5	47.6	45.5	28.5	51.9	48.6	38.0	33.0	30.3	56.6	39.7	43.3
		T2 Mean	**43.9**	**46.7**	**50.3**	**45.0**	**24.7**	**50.8**	**44.2**	**31.0**	**34.5**	**37.3**	**50.6**	**38.6**	**41.5**
T3 (water stress)	1	27P63	38.7	52.4	54.0	44.3	17.5	45.2	36.5	27.9	25.5	44.3	50.5	32.3	39.1
	2	HRI-174	43.7	46.1	53.6	46.4	22.3	48.9	37.4	30.7	12.1	41.5	49.6	34.8	38.9
	3	IIRRH-122	40.9	46.6	53.8	45.4	24.7	48.7	30.5	32.9	14.9	33.4	34.7	38.9	37.1
	4	IIRRH-131	44.7	45.8	54.3	44.4	24.5	47.8	38.7	32.7	14.9	41.6	45.0	34.9	39.1
	5	IRRH-132	60.3	47.8	55.0	43.1	24.5	49.8	40.2	42.3	15.9	31.6	45.1	36.4	41.0
	6	JKRH-3333	51.3	43.3	53.3	45.2	23.5	46.0	37.2	28.9	11.5	48.4	36.3	35.4	38.3
	7	KRH-4	56.7	46.5	46.7	44.9	24.6	48.4	37.3	37.4	14.1	32.0	40.6	32.7	38.5
	8	SB.DHAN	42.2	48.9	55.6	45.5	28.6	49.0	46.9	30.2	13.6	35.9	29.9	40.9	38.9
	9	US-314	58.3	48.0	56.4	45.2	30.3	50.9	46.6	34.2	31.7	37.9	51.3	36.4	43.9
		T3 Mean	**48.5**	**47.3**	**53.6**	**44.9**	**24.5**	**48.3**	**39.0**	**33.0**	**17.1**	**38.5**	**42.6**	**35.9**	**39.4**
T4 (water stress+silicon)	1	27P63	38.3	49.1	53.6	44.4	19.1	43.6	41.8	27.0	27.3	45.7	51.5	40.4	40.2
	2	HRI-174	43.7	44.0	47.0	46.5	23.4	47.9	36.1	30.4	30.1	40.0	50.7	34.3	39.5
	3	IIRRH-122	40.7	47.7	55.2	45.5	24.7	47.5	30.7	35.9	20.6	42.5	32.5	32.9	38.0
	4	IIRRH-131	45.0	43.7	49.8	44.4	21.0	47.8	38.8	34.3	32.2	41.5	45.5	32.9	39.7
	5	IRRH-132	59.7	47.8	55.3	43.5	26.6	49.0	41.7	40.7	25.4	26.0	45.7	33.6	41.2
	6	JKRH-3333	50.7	45.7	51.0	44.4	19.5	44.6	41.4	30.0	29.5	55.5	36.5	32.5	40.1
	7	KRH-4	56.3	44.9	48.4	45.4	21.9	49.9	40.0	34.4	18.5	33.2	40.1	35.1	39.0
	8	SB.DHAN	43.0	44.0	51.6	45.5	25.2	49.7	43.7	36.5	19.4	32.8	28.3	42.9	38.6
	9	US-314	58.3	48.0	53.1	45.5	27.2	49.7	44.9	33.2	9.3	42.7	53.9	44.9	42.6
		T4 Mean	**48.4**	**46.1**	**51.7**	**45.0**	**23.2**	**47.7**	**39.9**	**33.6**	**23.6**	**40.0**	**42.7**	**36.6**	**39.9**
		Grand Mean	**47.2**	**46.4**	**52.1**	**45.0**	**24.3**	**49.4**	**41.4**	**32.0**	**27.9**	**38.2**	**45.8**	**38.4**	**40.7**
		LSD (Silicon)						NS							
		LSD (Center x Silicon)						4.19**							
		LSD (Variety)						NS							
		LSD (Center x Variety)						4.42**							
		LSD (Silicon x Variety)						NS							
		LSD (Center x Silicon x Variety)						8.85**							
		CV (%) Silicon						14.3							
		CV (%) Residual						10.32							

SB.Dhan= Sahabhagidhan

6.2.1 Screening of elite rice cultures for drought tolerance:

Locations: NRRI, RANCHI, RPR, PTB AND REWA (kharif-2019), TTB (Rabi 2018-19)

Rain-fed rice ecosystems are home to 80 million farmers on 60 million ha. Progress has been slow in improving productivity, and drought is a major constraint affecting rice production, especially in rain-fed areas across Asia and sub-Saharan Africa. Even in traditionally irrigated areas, which account for almost 75% of total rice production, drought is becoming an increasing problem because of water scarcity resulting from rising demand for water for competing uses. Drought imposes a serious economic burden on society and has been historically associated with food shortages of varying intensities, including those that have resulted in major famines in different parts of Asia and Africa. For example, Pandey et al. (2007[1]) estimate production losses of 36% of the average value of production in eastern India in drought years. This represents a massive loss of US$856 million and, on a yearly basis, a loss of 6.8% of the average value of output in India. In addition to the direct effects on production, there are indirect effects of drought which may be felt over several years. Its impact can even span generations as, e.g., when children fail to recoup lost educational opportunities (Pandey et al., 2007[1]). Identification of suitable rice cultures for rainfed conditions is one of the research area of Plant Physiology group under AICRIP. A trial to study the drought tolerance traits of rice cultures with respect to yield and other attributes under dry spells was conducted with 30 rice genotypes taken from *IVT-E-DS* trial and 5 released varieties during Kharif-2019 at 5 locations and during Rabi-2018-19 season at TTB where in 22 AVT entries and 8 released varieties were tested for drought tolerance. The treatments consisted of two irrigation regimes a. Irrigated as per the recommended schedule and one totally rain fed condition without any supplementary irrigation.

Analysis of rainfall data indicated that at CBT centre the crop received total of 531.6 mm rainfall from sowing to physiological maturity with 50 rainy days. During vegetative period the crop received 292.1 mm rain with 33 rainy days (Fig.1) and during the period from flowering to maturity the crop received 239.5 mm rain with 17 rainy days.

[1] *Pandey S., Bhandari H., Hardy B. (eds). (2007). Economic Costs of Drought and Rice Farmers' Coping Mechanisms: A Cross-Country Comparative Analysis. Los Baños: IRRI, 203*

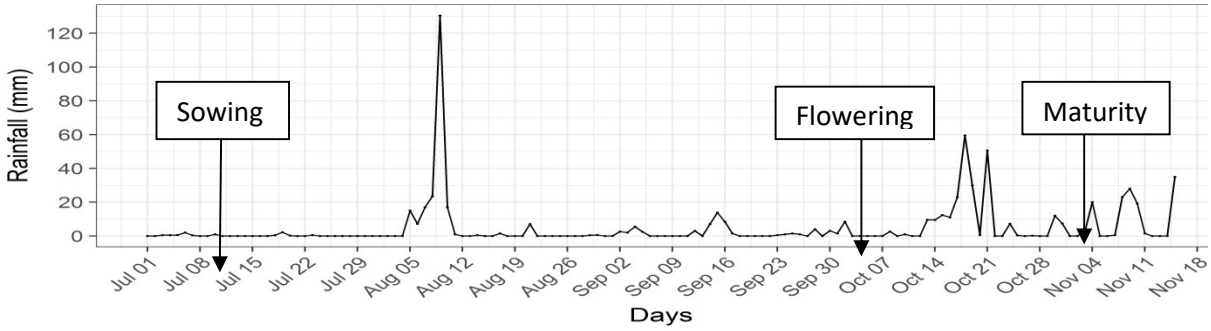


Fig. 6.2.1.1 Distribution of rain during crop season (sowing to maturity) at C BT centre during kharif-2019

At REWA centre the crop received 1241 mm rain between sowing and maturity stages with 54 rainy days. During vegetative phase from sowing to flowering stage the crop received 1101 mm rain with 46 rainy days and from flowering to maturity period it received only 140 mm rain with 8 rainy days (Fig. 2).

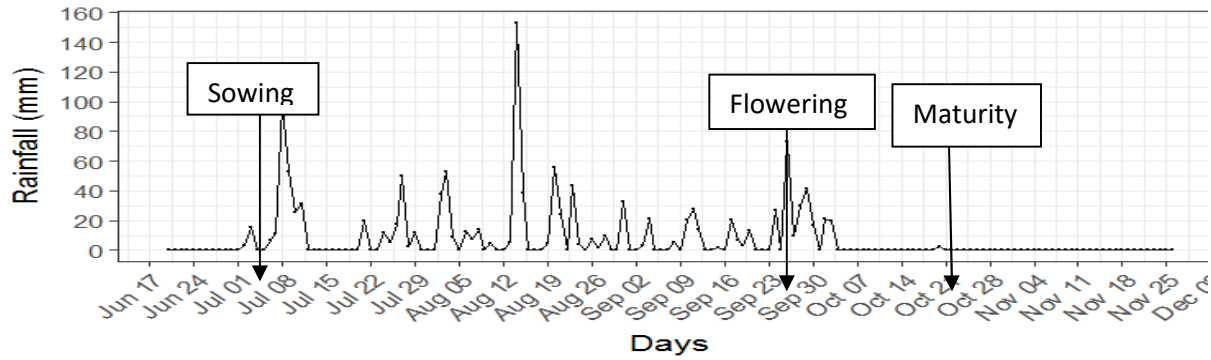


Fig. 6.2.1.2 Distribution of rain during crop season (sowing to maturity) at REWA centre during kharif-2019

During the crop season from sowing to maturity the crop received 955 mm rain with 49 rainy days at PTB centre. However, the crop received 924 mm rain with 45 rainy days during vegetative phase and after flowering up to maturity the crop received only 32 mm rain with 6 rainy days (Fig.3)

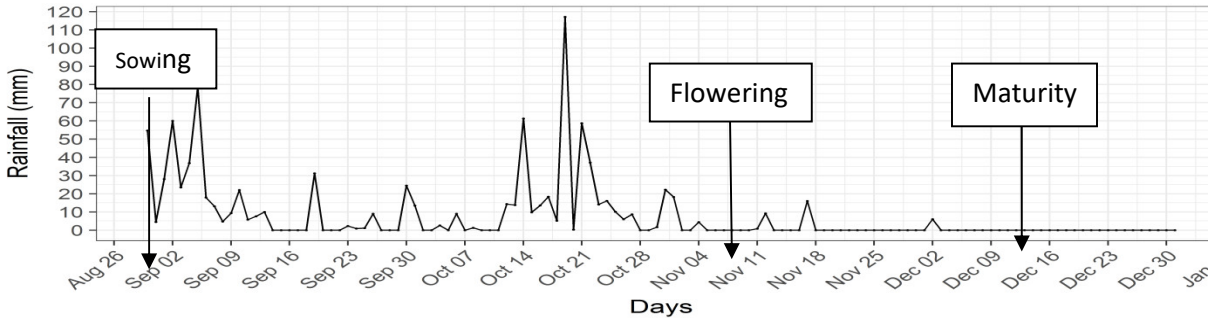


Fig. 6.2.1.3 Distribution of rain during crop season (sowing to maturity) at PTB centre during kharif-2019

At RPR centre the crop received a total of 978 mm rain with 57 rainy days out of which 862 mm with 51 rainy days was received during vegetative phase of crop growth and after flowering to maturity the crop received 116 mm rain with 6 rainy days (Fig. 4)

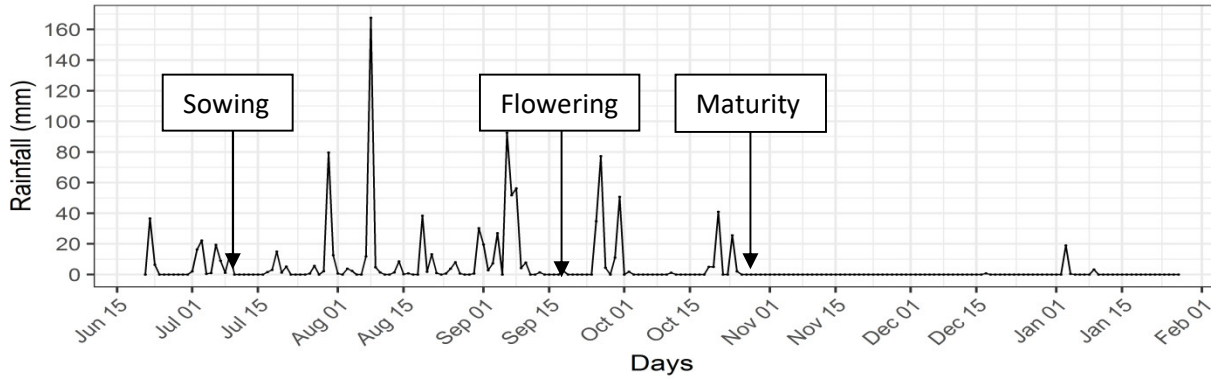


Fig. 6.2.1.4 Distribution of rain during crop season (sowing to maturity) at RPR centre during kharif-2019

Days to flowering and Days to maturity were not significantly influenced by the irrigation regimes (Table 6.2.1). The interaction between Location x Treatment and Treatment x Genotype and Location x Genotype are found to be non-significant. Significant differences($p<0.05$) were noticed amongst the tested genotypes for both mean days to flowering and days to maturity (Table 6.2.1).

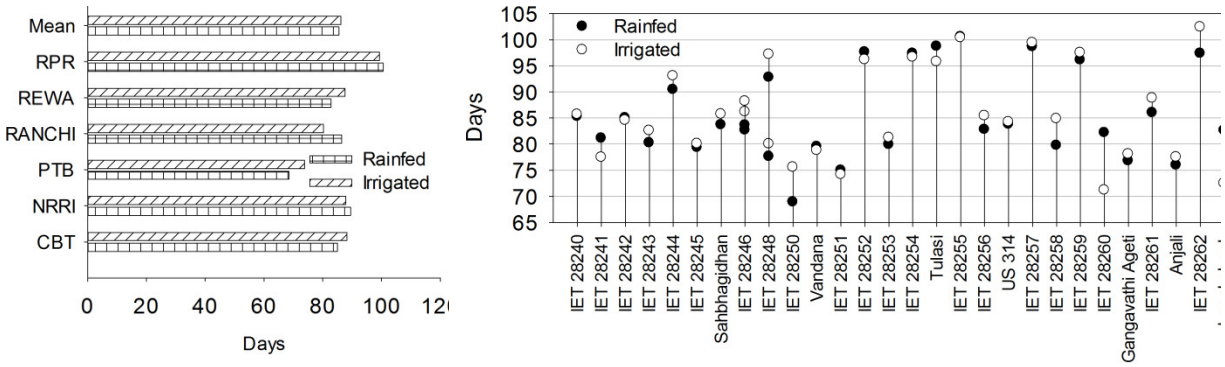


Fig.6.2.1.5 : Influence of irrigation regimes on mean days to flowering of different rice genotypes grown at different locations during kharif-2019

The shoot **weight/plant (g)** is an important parameter as the stems store carbon and nitrogen during vegetative stage and remobilize the same during grain filling period and supplement the carbon from flag leaf photosynthesis. Irrigation regimes show no significant influence on mean (mean of all locations and genotypes) (Table 6.2.3). However, the interaction between Location x Treatment was found to be statistically significant ($p<0.01$) implying that the effect of treatment is not uniform across the locations. However, the mean shoot weight (mean of all genotypes) was reduced by >38% under rainfed treatment.

Maximum reduction in was observed at PTB followed by RPR centre. Minimum reduction in mean shoot weight was observed at RANCHI followed by REWA centre (Fig.6.2.5).

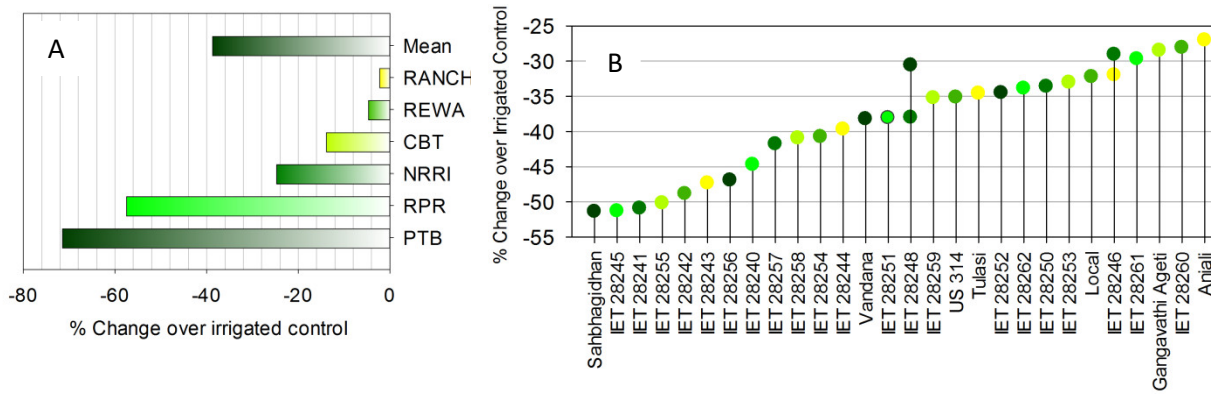


Fig.6.2.1.5: Influence of irrigation regimes on shoot weight recorded at flowering stage in different rice genotypes at different AICRIP centres during kharif-2019 season. [A] Mean of all genotypes [B] Mean of all locations.

Maximum reduction in mean shoot weight was observed in Sahabhagidhan, IET28245 and IET 26241 in which the reduction in shoot weight in relation to irrigated control was >50%. Anjali, IET 28260 and Gangavati Agent performed well with minimum reducing in shoot weight (<30% reduction under rainfed condition). The interaction between Location x Genotype was found to be significant (Table 6.2.3).

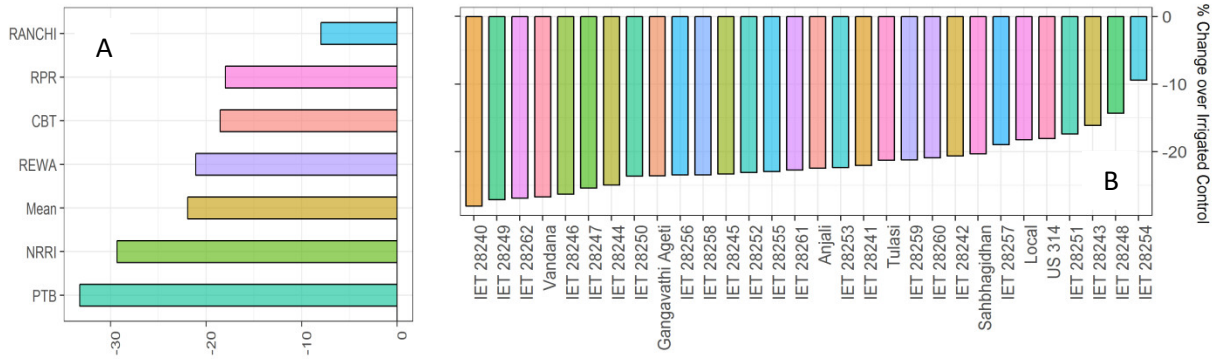


Fig.6.2.1.5: Influence of irrigation regimes on Number of Panicles m^{-2} different rice genotypes at different AICRIP centres during kharif-2019 season. [A] Mean of all genotypes [B] Mean of all locations.

Number of panicles m^{-2} is an important yield trait which was affected by the water regimes. Analysis of variance suggest that the irrigation regime had non-significant influence on mean (mean of all genotypes and locations) panicle number (Table 6.2.4). However, the interaction between Treatment x Location was found to be significant ($p<0.01$). The mean panicle number was reduced by 18% under rainfed treatment in comparison with irrigated treatment. Maximum reduction in number of panicles was observed at PTB followed by NRRI centre. The effect was relatively lower at RANCHI centre (Fig.6.2.5A). When mean of all locations

and treatments was considered, the differences amongst the genotypes was non-significant. However, number of panicles were reduced under rainfed conditions. Maximum reduction was observed in IET 28240, IET 20249, IET 28262 and vandana where in the reduction in panicle number was 20% under rainfed condition in comparison with irrigated control. Minimum reduction was observed in IET 28264 and IET28248 (Fig.6.2.5B). The interaction between Genotype x Location was found to be significant implying that the genotypes behaved differently at different locations. However, the interaction between Genotype x Treatment was found to be non-significant indicating that there was no difference between genotypes in their response to irrigation conditions.

Grain number per panicle is one of the most important yield trait which was significantly ($p<0.01$) affected by the irrigation regimes (Table 6.2.6) Under rainfed condition, the mean (mean of all genotypes and locations) was reduced by >22% in comparison with irrigated treatment. The interaction between Location x Treatment was highly significant ($p<0.01$). At RANCHI centre no change in number

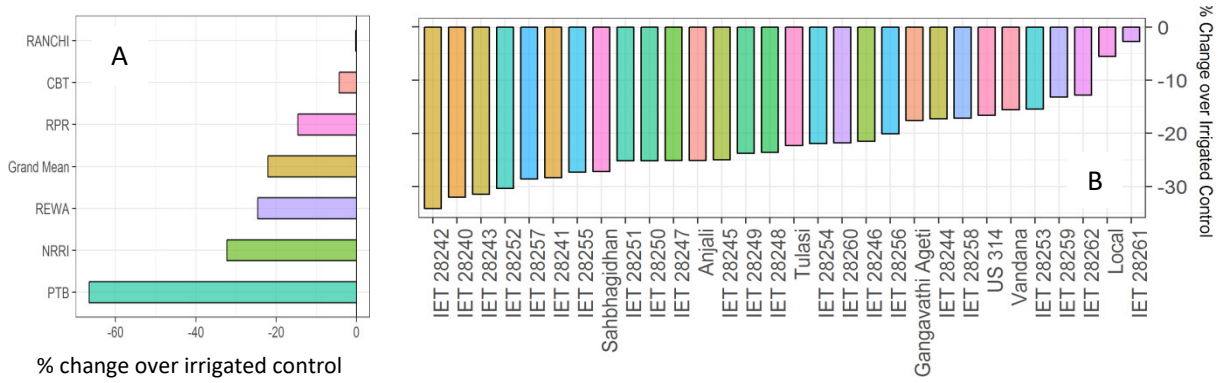


Fig.6.2.1.6: Influence of irrigation regimes on Number of Grains Panicles^{-1} in different rice genotypes at different AICRIP centres during kharif-2019 season. [A] Mean of all genotypes [B] Mean of all locations.

of grains was observed. Maximum reduction in number of grains was noticed at PTB centre followed by NRRI. At the remaining centres the reduction in grain number is less than the mean of all locations (Fig.6.2.6). Analysis of variance results indicate that the mean (mean of all locations & treatments) grain number did not varied amongst the genotypes. However, the interaction between Location x Genotype was found to be significant, which indicated that the genotypes behaved differently at different locations (Table 6.2.6). The interaction between Genotype x treatment was non-significant. The reduction in grain number was lower in case of IET 28261 followed by local check and IET28262. Maximum reduction was observed in IET28242 followed by IET28240, IET28242 and IET28252 (*Fig.6.2.6B).*

Total number of spikelets per panicle is another important yield trait which was significantly affect by the water regime (Table 6.2.7). The mean (mean of all genotypes and locations) spikelet number was reduced by >7% in rainfed condition in comparison with irrigated control (Fig.6.2.7A). Results of ANOVA indicated that a significant ($p<0.01$) interaction exists between Treatment x Location implying that the effect of treatment varied between locations. The reduction in No.spikelets panicle^{-1} was lowest at RANCHI centre followed by CBT and RPR which is lower than the mean reduction.

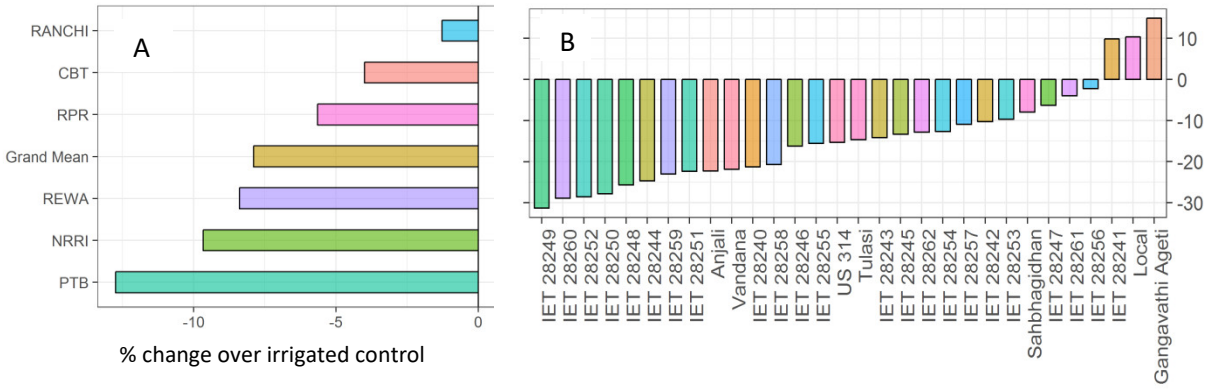


Fig.6.2.1.7: Influence of irrigation regimes on Number of Grains Panicles^{-1} in different rice genotypes at different AICRIP centres during kharif-2019 season. [A] Mean of all genotypes [B] Mean of all locations

Maximum reduction in No.spikelets panicle^{-1} was observed at PTB centre followed by NRRI. The mean number of spikelets (mean of all locations & treatments) did not varied significantly amongst the genotypes (Table 6.2.7). In genotypes like Gangavathi Agent, Local chek and IET 28241 the No. Of spikelets recorded marginal increase under rainfed treatment. IET 28249, IET28260, IET 28250 and IET28248 recorded maximum reduction in spikelet number (Fig.6.2.7B). A significant interaction was observed between Genotype x Location.

Test weight (1000 grain weight) is one of the important yield trait which was recorded. The mean test weight (mean of all genotypes and locations) was not significantly affected by the water regime (Table 6.2.11). The mean test weight was reduced by >17% under rainfed treatment (Fig 6.2.8A). The interaction between Location x Treatment was found to be highly significant ($p<0.01$) indicating that the treatment effect varied between locations. Maximum reduction in mean test weight was recorded at PTB centre followed by CBT and REWA in the remaining locations the reduction is only marginal (Fig.6.2.8A). The differences amongst the genotypes was significant ($p<0.05$) for mean test weight (mean of

treatments and locations). The interaction between Location x Genotype was also found to be significant ($p<0.01$) indicating that the response of genotypes varied between locations (Table 6.2.11).

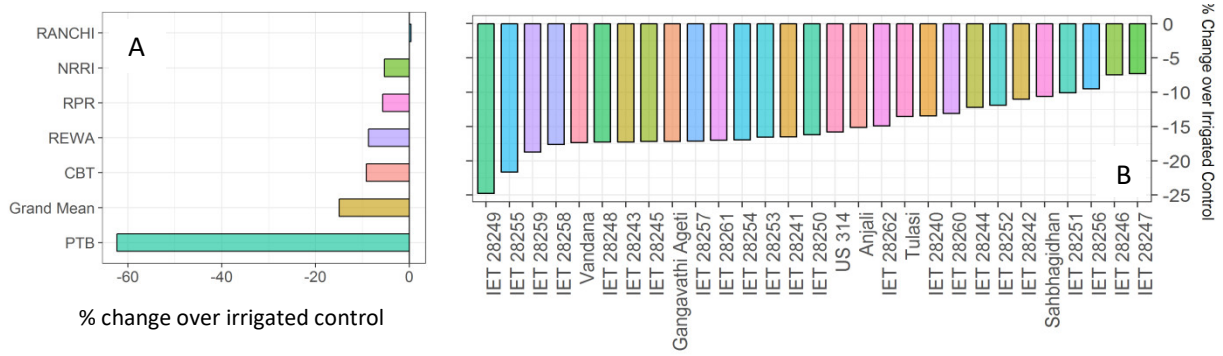


Fig.6.2.1.8: Influence of irrigation regimes on 1000 grain weight in different rice genotypes at different AICRIP centres during kharif-2019 season. [A] Mean of all genotypes [B] Mean of all locations

The reduction in test weight is highest in IET 28249 followed by IET28255. Minimum reduction in test weight under rainfed condition was observed IET 28247, IET28248, IET 28256 and Sahabhagidhan *(Fig.6.2.1.8B).*

Mean grain yield (mean of all genotypes and locations)was significantly ($p<0.06$) affected by the water regimes. Grain yield was reduced by >28% under rainfed condition in comparison with irrigated control *(Fig.6.2.1.9A).* The interaction effect between Treatment x Location is highly significant ($p<0.01$) implying that the treatment effect is not uniform across locations. With the exception of PTB centre at

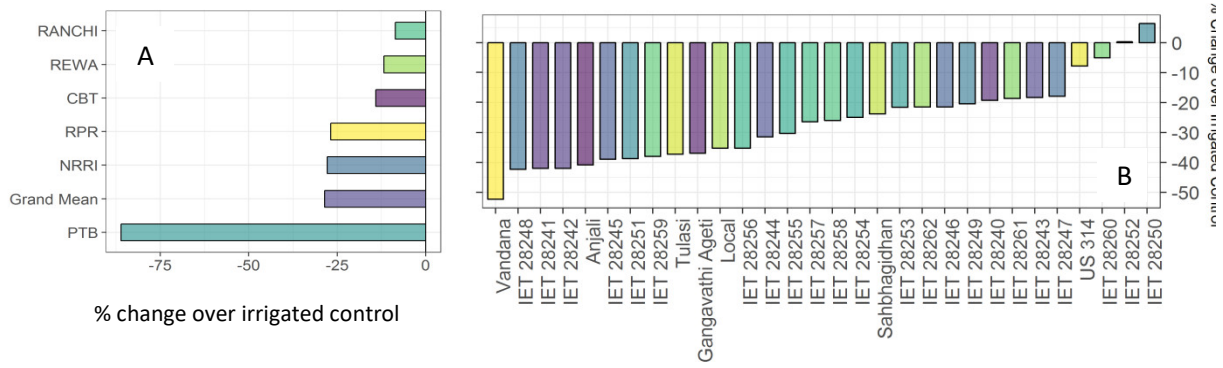


Fig.6.2.1.9: Influence of irrigation regimes on grain yield in different rice genotypes at different AICRIP centres during kharif-2019 season. [A] Mean of all genotypes [B] Mean of all locations

all other centres the reduction in grain yield under rainfed condition is equal to or less than the mean of all location. At PTB centre the reduction is very high (>80% over control).

Significant differences were observed among the genotypes in their response to water stress condition. The reduction in grain yield is lowest in IET 28250, IET 28262, IET 28262, IET 28660 and US 314 which less than the mean value for all the genotypes. These entries are suitable for rainfed cultivation (Table 6.2.10).

***Drought Tolerance Indices**:* Loss of yield is the main concern of plant breeders and they hence emphasize on yield performance under stress conditions. Thus, drought indices which provide a measure of drought based on loss of yield under drought-conditions in comparison to normal conditions have been used for screening drought/tolerant genotypes. In order to identify genotypes tolerant to high temperature, different indices were computed based on the grain yield recorded under ambient and elevated conditions. Different Drought tolerance indices including Drought susceptibility index (DSI), Relative Drought index (RDI), Drought tolerance index (DTI), Geometric mean productivity (GMP), Tolerance (TOL), Mean production (MP), Yield index (YI), Heatt resistance index (HI), Yield stability index (YSI), Modified stress tolerance index (KiSTI), were calculated using the relationships of (Fischer and Maurer, 1978; Fischer et al., 1998; Fernandez, 1992; Rosielle and Hamblin, 1981; Bouslama and Schapaugh, 1984; Blum, 1988; Moosavi et al., 2008; Farshadfar and Sutka, 2002). For calculating different drought indices, the means of all locations were used.

The results of Drought tolerance indices were presented on Table 6.2.15 The data revealed that significant variation was observed amongst the genotypes for different drought indices. Based on different drought indices individual entries were ranked. The rank sum and mean rank was calculated for each entry and standard error was computed. The genotype having high Mean Rank ±low SEm was considered as most suitable for rain fed conditions as they have relative tolerance to water stressed conditions. The data pertaining to the drought indices and their ranks were presented in Table. 10. The data revealed that IET 28252, IET 28256, IET 28245, Sahabhagidhan and US-314 have high Mean Rank with low SEm and they may be considered as relatively drought tolerant and are suitable for rain fed cultivation.

Multiple correlation was performed between yield, measured rain fed condition and drought tolerance indices. The correlation analysis between grain yield and tolerance indices can be a good criterion for screening the best cultivars and indices used. A suitable index must have a significant association with yield recorded under stress condition. The results of

correlation analysis indicated that the indices like GMP (Geometric Mean Production), DTI (Drought Tolerance Index, Yi (Yield Index), HM (Hormonic Mean), K1STO, K2STI (Modified Stress Tolerance Index), Yield index (YI) showed highly significant positive association with grain yield recorded under stress condition. These indices are useful in selecting suitable genotypes for drought tolerance. These indices show strong association with the yield recorded under control conditions also.

Correlation between grain yield and other important drought tolerance traits. Mean grain yield from all the centres were used to perform Pearson's correlation.

	Yp	*Ys*	*DSI*	*RDI*	*DTI*	*GMP*	*TOL*	*MP*	*YI*	*YSI*	*DI*	*SDI*	*HM*	*K1STI*	*K2ST*
Yp	1.00														
Ys	0.89	1.00													
DSI	0.51	0.06	1.00												
RDI	-0.50	-0.06	-1.00	1.00											
DTI	0.96	0.97	0.28	-0.27	1.00										
GMP	0.97	0.97	0.31	-0.30	0.99	1.00									
TOL	0.84	0.49	0.89	-0.89	0.67	0.69	1.00								
MP	0.98	0.96	0.35	-0.34	0.99	1.00	0.72	1.00							
YI	0.89	1.00	0.06	-0.05	0.97	0.97	0.48	0.96	1.00						
YSI	-0.50	-0.05	-1.00	1.00	-0.27	-0.30	-0.89	-0.34	-0.05	1.00					
DI	0.57	0.88	-0.41	0.41	0.75	0.74	0.02	0.71	0.89	0.42	1.00				
SDI	0.50	0.05	1.00	-1.00	0.27	0.30	0.89	0.34	0.05	-1.00	-0.42	1.00			
HM	0.96	0.98	0.27	-0.26	1.00	1.00	0.66	1.00	0.98	-0.26	0.77	0.26	1.00		
K1STI	1.00	0.89	0.48	-0.47	0.97	0.98	0.82	0.98	0.89	-0.47	0.59	0.47	0.97	1.00	
K2STI	0.88	1.00	0.05	-0.05	0.97	0.96	0.48	0.95	1.00	-0.04	0.88	0.04	0.97	0.89	1.(

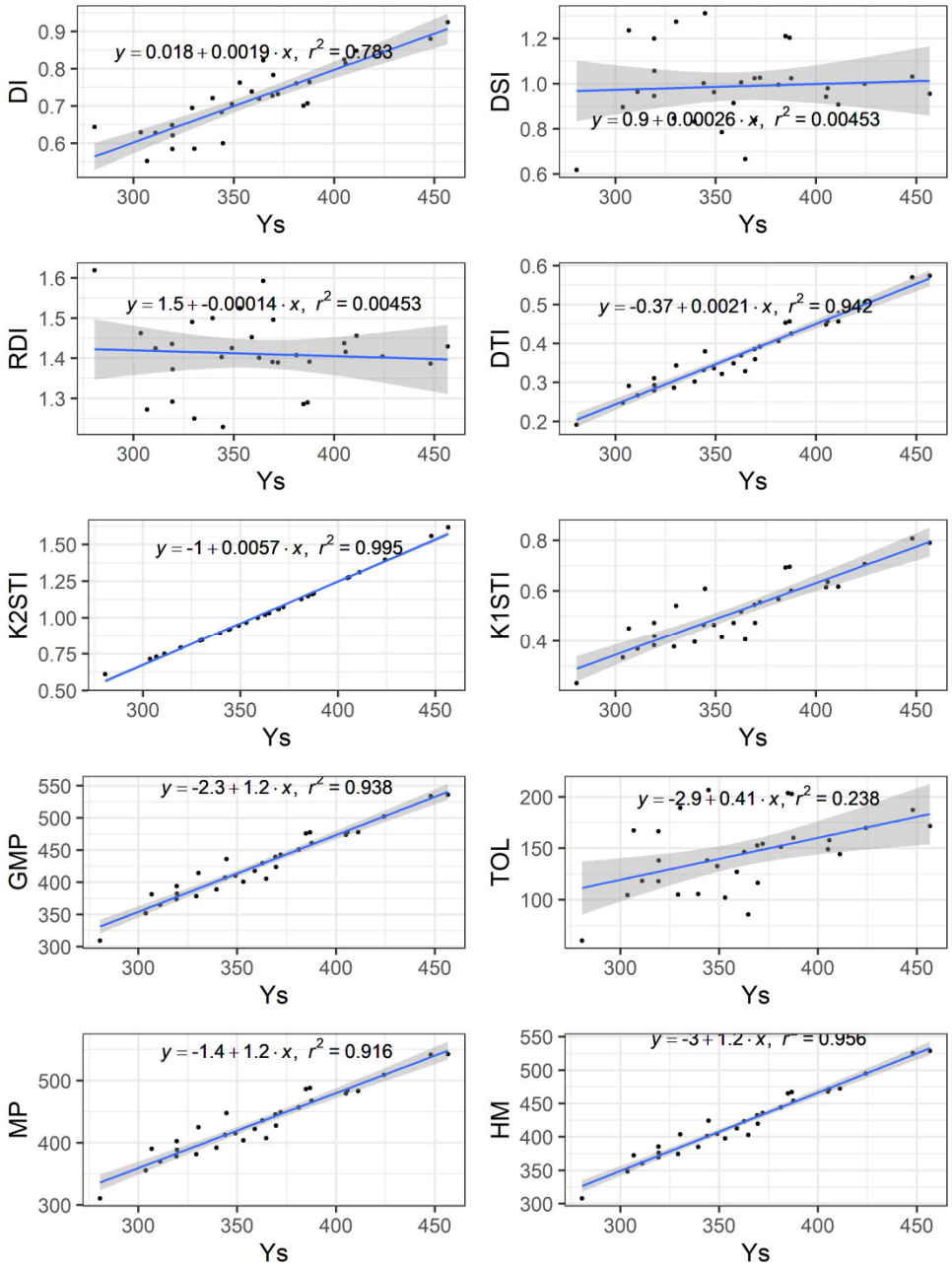


Fig: 6.2.1.10: Relationship between grain yield under rainfed condition and different drought indices. Drought indices were computed using mean grain yield recorded at different centres under rainfed and irrigated conditions.

In order to simultaneously select genotypes with higher yield and stability of performance across locations under elevated temperature conditions, a parametric model for simultaneous selection in yield and stability "shukla's stability variance and kang's" statistic was performed and the results were presented in (Tables (6.1.12 and 6.2.1.3). Based on the YS_i values genotypes can be selected as they produced relatively higher yield under rainfed condition (drought) and also they show non-significant stability variance (σ_i^2). These genotypes have a higher yield and a lower variation. According to the ANOVA, the

interaction is significant. Based on stability analysis IET 28243, Sahabhagidhan, IET 28246, IET 28247, IET 28249, IET 282 51, IET 280 52, IET 28254, Tulsi, IET 28255, 28256, US314, IET 28260 and IET 28262 can be selected as stable genotypes which performed well across the locations.

6.2.2 Screening of elite rice genotypes for drought tolerance during Rabi 2018-19 season at TTB

At TTB centre this trial was conducted during Rabi season with Rabi-2018-19 season at TTB where in 22 AVT entries and 8 released varieties were tested for drought tolerance. The treatments consisted of rainfed (drought) and recommended irrigation. One of the important trait which was recorded at flowering stage is No of Panicles/plant which was significantly ($p<0.01$) affected by water regime. The mean(mean of all genotypes) was reduced by >18% under rainfed treatment in comparison with irrigated control (Fig.6.2.2.1A). Significant differences were observed amongst the genotypes. The reduction in number of tillers/plant was lowest in IET27527 followed by IET 27526, IET 27518 (Table 6.2.2.1). The interaction between Treatment x Genotype was also found to be highly significant.

Fig. 6.2.2.1: Influence of water regimes on No. of tillers and stem weight recorded at flowering stage at TTB centre during Rabi-2018-19.

Stem weight recorded before anthesis is one of the important trait for drought tolerance as the accumulated carbon and nitrogen before anthesis will be remobilized into developing grain during grain filling stage which supplement the carbon from current photosynthesis. The

stem weight was significantly reduced ($p<0.01$) by >17.8% reduction under rainfed condition over irrigated control. Significant differences were observed amongst the genotypes. The interaction between the Treatment x Genotype was found to be significant ($p<0.01$). The reduction in stem weight is lowest in IET 27527, IET 27526, IET 27511 and IET 27518 (*Fig.62.2.1B)*

Results on effect of water regimes on important yield traits like Panicle weight/ m2, Panicle number/m2, number of grain per panicle are presented in Table 6.2.2.2. All these parameter are significantly influenced by the water regimes. A significant variation was observed amongst the genotypes for these important traits and the interaction between the Treatment x Genotypes was also found to be highly significant indicating that the influence of the water regime treatment differs from genotypes to genotype.

Similarly, the number of spikelets and number of grains recorded after harvest also show significant changes under rainfed condition in comparison with irrigated treatment. Significant genotypic differences were observed for all these traits. The interaction between Treatment x Genotype was found to be significant for all these traits implying that significant differences exists amongst the genotypes in their response to imposed treatments.(Table 6.2.2.3).

Results on Grain yield, 1000 grains weight and harvest index was presented in table 6.2.2.4). Test weight or 1000 weight was significantly affected by water regimes. The mean test weight was significantly ($p<0.01$) reduced by <13% under rainfed condition in comparison with irrigated control. Significant differences were observed amongst the genotypes for mean test weight. Maximum test weight was recorded in IET 27519, IET 27511, IET 27525, IET 275 and IET 27514. Lowest test weight was observed in IET 27509 followed by Simaseswari (Table 6.2.2.4).

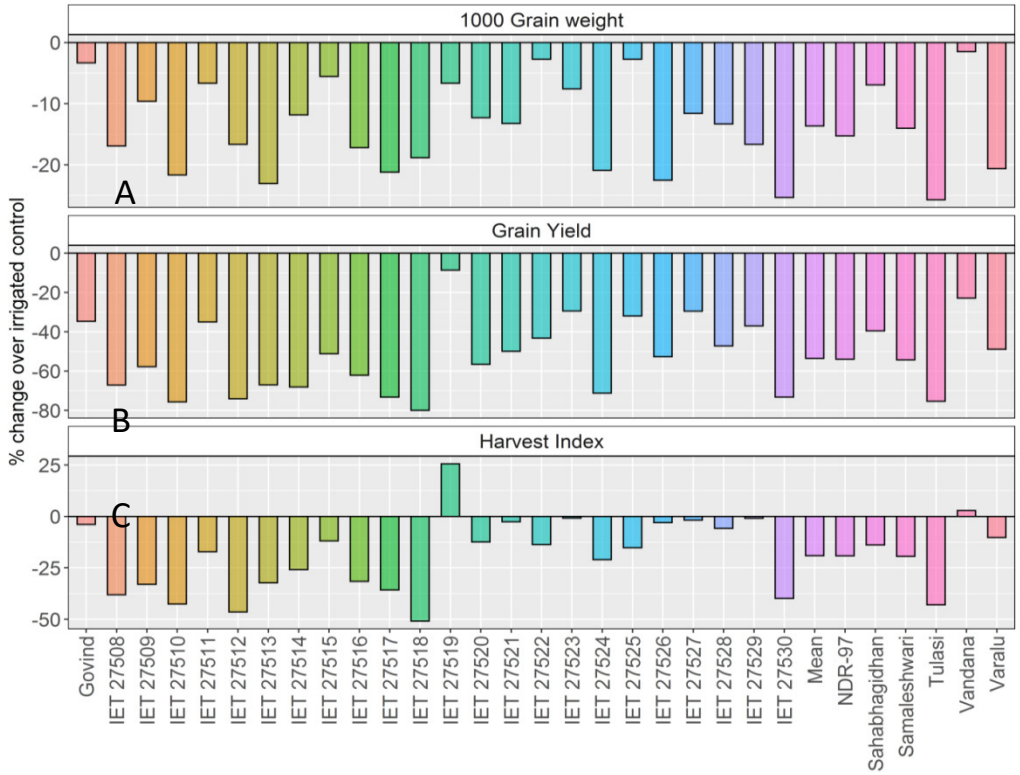


Fig.6.2.2.2: Influence of water regimes on 1000 grain weight, Harvest Index and grain yield in different rice genotypes

Significant ($p<0.01$) interaction was observed between Treatment x Genotype for test weight. The reduction in test weight was minimum in Vandana, IET 27522, IET27525 and IET 27515 (Fig.6.2.2.2A). Maximum reduction was observed in Tulasi.

Harvest index is one of the most important trait which was negetively affected by the water regimes. HI was reduced by >19% under rainfed treatment in comparison with irrigated treatment. Significant interaction was observed between Treatment x Genotype ($p<0.01$) for HI. The reduction in HI was minimum in Varalu, Vandana, sahabhagidhan, IET 25729, 25727, 25726, 25728, IET 27523, IET 27521 and Govind *(Fig.6.2.2.2C).*

Grain yield was significantly ($p<0.01$) affected by water regimes. The mean grain yield was reduced by >53% under rainfed condition in comparison with irrigated control. Significant differences were observed amongst the genotypes for grain yield. The grain yield varied between 360 g/m^2 (IET 25715) to a minimum of 195 g/m^2 (NDR-97) with a mean of 276 g/m^2 (Table 6.2.2.4). Significant interaction was observed between Treatment x Genotype. The reduction in grain yield was minimum in IET 27519, Vandana and Govind these varieties may be considered as drought tolerant and are suitable for rainfed cultivation (Fig.6.2.2.2B).

Different Drought tolerance indices including Drought susceptibility index (DSI), Relative Drought index (RDI), Drought tolerance index (DTI), Geometric mean productivity (GMP), Tolerance (TOL), Mean production (MP), Yield index (YI), Heatt resistance index (HI), Yield stability index (YSI), Modified stress tolerance index (KiSTI), were calculated. The data on the indices was presented in table 6.2.2.6. Genotypes were ranked for each index and the rank sum and mean rank and SEm was computed. Drought tolerant genotypes were identified based on the high mean rank and low SEm. The entries IET 27514, 27522, Govind, 27520, 27525, 27519 and Sammaleswari could be identified as drought tolerant and are suitable for cultivation and rainfed conditions. Multiple correlation analysis between yield obtained under ranfed condition and the computed yield indices revealed a strong positive association between yield for BMP, MP, YSI, YI and strong negetive relation was observed for DSI, TOL and, SDI these indices are useful for identification drought tolerant genotype.

Summary & Conclusions

A trial was conducted 30 rice genotypes taken from *IVT-E-DS* trial and 5 released varieties during Kharif-2019 at 5 locations and during Rabi-2018-19 season at TTB where in 22 AVT entries and 8 released varieties were tested for drought tolerance. Treatments consists of total rainfed condition with out any supplementary irrigation and another with recommended irrigation. Based on the reduction in grain yield under rainfed condition IET 28250, IET 28262, IET 28262, IET 28660 and US 314 could be identified as relatively drought tolerant and these entries are suitable for rainfed cultivation. Based on drought indices computed, IET 28252, IET 28256, IET 28245, Sahabhagidhan and US-314 have high Mean Rank with low SEm and they may be considered as relatively drought tolerant and are suitable for rain fed cultivation. Stability analysis indicated Based on stability analysis IET 28243, Sahabhagidhan, IET 28246, IET 28247, IET 28249, IET 282 51, IET 280 52, IET 28254, Tulsi, IET 28255, 28256, US314, IET 28260 and IET 28262 can be selected as stable genotypes which performed well across the locations. At TTB the trial was conducted during Rabi season. Based on the reduction in yield under rainfed condition IET 27519, Vandana and Govind can be identified as drought tolerant varieties. Various drought tolerance indices were computed and based on high mean rank and low SEm the genotypes IET 27514, IET27522, Govind, IET 27520, 27525, 27519 and sammaleswari could be identified as relatively drought tolerant and suitable for rainfed conditions.

Table 6.2.1 Screening for elite rice culture for drought tolerance on Days to flowering at different centres Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigated						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	90.0	89.0	66.7	89.7	79.3	98.0	85.3	81.0	89.0	70.3	90.3	85.3	97.0	81.0
2	IET 28241	74.0	79.0	60.0	84.7	72.0	97.0	81.1	72.0	80.0	70.7	78.0	76.0	98.0	72.0
3	IET 28242	91.0	88.0	67.0	92.0	80.0	117.0	85.0	82.0	82.7	69.7	92.0	86.0	88.0	82.0
4	IET 28243	79.0	88.0	68.3	77.7	75.3	92.0	80.2	81.0	83.0	70.3	87.0	81.0	95.0	81.0
5	IET 28244	91.0	90.0	74.3	97.0	84.3	93.0	90.4	95.0	95.7	70.3	95.7	95.7	93.0	95.0
6	IET 28245	74.3	78.0	68.3	84.0	73.3	106.0	79.3	79.0	80.0	70.7	82.3	79.3	106.0	79.0
7	Sahbhagidhan	91.0	84.7	67.7	88.7	78.0	98.0	83.7	90.0	86.7	71.3	90.3	83.0	89.0	90.0
8	IET 28246	84.0	86.0	65.7	89.7	79.7	92.0	82.7	91.0	84.0	76.0	88.7	86.3	93.0	91.0
9	IET 28247	75.0	87.0	70.0	92.0	82.3	91.0	83.6	91.0	88.7	70.7	91.0	91.3	91.0	91.0
10	IET 28248	74.0	84.3	57.0	84.0	74.3	95.3	77.6	71.0	83.0	71.0	80.7	80.3	96.3	71.0
11	IET 28249	86.0	100.0	68.3	101.3	93.0	92.0	92.8	102.0	95.0	77.0	102.7	97.3	94.0	102.0
12	IET 28250	81.0	87.0	69.7	1.3	79.0	108.0	68.9	90.0	87.3	70.7	22.0	85.3	109.0	90.0
13	Vandana	68.0	84.0	56.0	84.0	69.0	95.3	79.5	71.0	80.0	70.3	77.3	79.0	98.0	71.0
14	IET 28251	87.0	89.0	68.3	31.7	77.7	116.0	74.9	81.0	83.0	76.0	22.0	86.0	95.0	81.0
15	IET 28252	97.0	103.0	74.3	106.7	97.7	96.0	97.6	93.0	97.0	77.3	105.3	99.3	97.0	93.0
16	IET 28253	75.0	82.0	69.3	86.7	75.3	107.0	79.9	81.0	82.0	70.7	81.3	81.3	105.0	81.0
17	IET 28254	105.0	97.0	77.3	102.0	95.0	91.0	97.4	105.0	97.0	77.7	103.3	87.0	91.0	105.0
18	Tulasi	108.0	99.0	78.0	102.0	95.3	108.0	98.7	106.0	96.0	79.0	103.3	87.7	110.0	106.0
19	IET 28255	109.0	103.3	76.3	105.3	95.3	110.0	100.6	107.0	97.0	80.3	107.3	97.7	102.7	107.0
20	IET 28256	81.0	87.0	66.0	91.7	80.0	114.0	82.8	83.0	85.0	74.3	91.3	85.7	113.0	83.0
21	US 314	81.0	89.0	71.3	91.3	78.0	91.0	83.8	83.0	87.3	70.7	91.0	82.3	93.0	83.0
22	IET 28257	96.0	102.7	75.7	107.7	95.0	92.0	98.7	106.0	96.0	76.3	107.3	97.7	91.0	106.0
23	IET 28258	79.0	78.0	71.7	78.7	73.0	115.0	79.7	82.0	82.0	70.3	78.7	78.0	113.0	82.0
24	IET 28259	96.0	99.0	75.3	101.3	93.0	98.0	96.1	106.0	94.0	76.0	100.7	98.3	118.0	106.0
25	IET 28260	75.0	89.0	65.7	86.0	80.3	112.0	82.2	81.0	88.7	76.7	2.3	82.3	110.0	81.0
26	Gangavathi Ageti	69.0	81.0	69.7	81.3	71.7	97.0	76.8	74.0	79.0	71.0	79.3	77.0	96.0	74.0
27	IET 28261	87.0	88.0	69.3	86.0	83.7	88.0	86.0	93.0	92.0	79.7	65.3	97.7	88.0	93.0
28	Anjali	76.0	79.0	59.3	78.7	73.7	102.0	75.9	72.0	80.0	71.0	78.0	76.0	105.0	72.0
29	IET 28262	85.0	106.0	67.7	102.0	107.7	89.0	97.4	101.7	96.3	79.7	110.7	110.3	88.0	101.7
30	Local	87.0	87.0	59.0	88.3	91.7	116.0	82.6	95.0	88.0	79.3	2.3	97.7	116.0	95.0
	Mean	**85.0**	**89.5**	**68.4**	**86.4**	**82.8**	**100.6**	**85.5**	**88.2**	**87.8**	**73.8**	**80.3**	**87.6**	**99.3**	**88.2**
	LSD (Treat)			NS					LSD (Treat x Genotype)				NS		
	LSD (Location x Treat)			NS					LSD (Location x Treat x Genotype)				NS		
	LSD (Genotype)			6.17**					CV (%)				12.0		
	LSD (Location x Genotype)			NS											

Table 6.2.1 Screening for elite rice culture for drought tolerance on Days to Maturity at different centres Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigated						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	121.0	98.0	102.0	110.3	57.3	123.0	101.6	109.7	93.3	102.0	109.3	59.3	122.0	99.4
2	IET 28241	101.0	97.7	96.7	103.0	56.3	121.0	94.9	100.0	92.7	102.7	103.0	58.3	123.0	94.9
3	IET 28242	122.0	96.3	101.7	112.7	80.0	115.0	104.8	142.0	96.3	102.3	112.3	82.0	113.0	109.2
4	IET 28243	107.0	97.7	103.3	105.3	78.7	116.0	101.7	109.0	98.0	102.3	106.3	78.7	120.0	101.9
5	IET 28244	123.0	92.7	108.7	118.0	79.3	118.0	108.8	123.0	97.7	103.3	115.3	83.3	117.0	108.8
6	IET 28245	116.3	97.7	103.3	105.3	75.7	131.0	101.4	109.0	92.7	102.3	104.3	81.0	130.0	100.2
7	Sahbhagidhan	108.0	92.7	102.7	110.3	75.0	110.0	100.4	120.3	96.3	103.3	111.7	78.3	112.0	104.3
8	IET 28246	111.0	97.7	100.0	112.0	80.0	113.7	101.8	118.0	98.0	107.0	112.7	84.0	116.0	105.4
9	IET 28247	102.0	92.7	103.7	113.3	79.3	110.0	102.5	120.3	97.7	102.3	114.0	83.0	113.0	103.4
10	IET 28248	101.0	97.7	94.7	105.7	77.0	124.0	98.7	100.0	92.7	103.0	106.3	79.7	103.3	99.9
11	IET 28249	114.0	96.3	103.0	123.0	76.0	116.0	105.8	135.0	96.3	106.7	43.3	80.3	118.0	99.4
12	IET 28250	110.0	97.7	104.7	106.3	81.3	122.7	102.6	121.0	98.0	102.3	107.0	84.7	135.0	105.8
13	Vandana	96.0	92.7	94.7	103.0	78.7	115.7	97.2	109.3	97.7	102.3	103.0	82.0	122.0	100.4
14	IET 28251	118.0	97.7	103.0	112.0	78.3	118.3	104.8	111.0	92.7	107.0	111.3	84.0	108.0	102.8
15	IET 28252	127.0	92.7	109.0	129.3	76.3	120.0	111.6	122.0	96.3	107.0	127.3	79.0	110.7	110.6
16	IET 28253	102.0	97.7	105.7	138.3	78.3	135.0	106.5	100.0	98.0	102.3	139.3	82.0	132.0	106.6
17	IET 28254	122.7	92.7	112.3	124.7	77.3	117.0	110.3	134.0	97.7	106.7	124.7	80.3	118.0	111.2
18	Tulasi	136.0	97.7	110.0	125.7	78.7	132.0	113.8	136.0	92.7	107.3	126.0	85.0	123.7	113.3
19	IET 28255	136.0	96.3	110.3	128.3	76.3	135.0	114.6	136.0	96.3	107.0	128.3	80.3	133.0	114.3
20	IET 28256	108.0	97.7	102.0	112.3	76.3	140.0	105.7	142.0	98.0	105.3	112.7	75.0	138.0	112.2
21	US 314	109.7	92.7	105.3	110.3	74.7	138.0	100.8	141.7	97.7	102.0	110.7	77.0	140.0	107.2
22	IET 28257	134.0	97.7	111.3	130.7	71.7	112.0	114.1	125.3	92.7	106.3	130.3	74.0	114.0	110.9
23	IET 28258	106.0	92.7	106.7	106.0	72.0	139.0	99.1	110.0	96.3	102.3	106.0	72.7	137.0	99.9
24	IET 28259	136.0	97.7	110.3	123.7	75.3	111.0	111.3	137.0	98.0	106.7	124.7	79.3	112.0	111.6
25	IET 28260	105.0	92.7	103.0	112.7	74.0	124.7	101.7	111.0	97.7	108.0	113.7	78.3	123.7	105.1
26	Gangavathi Ageti	96.0	97.7	105.0	104.0	75.3	123.0	98.3	101.0	92.7	102.7	104.0	78.7	122.0	98.3
27	IET 28261	116.0	96.3	103.0	115.0	67.3	112.0	104.1	124.0	96.3	108.3	22.7	73.0	111.0	92.6
28	Anjali	102.0	97.7	95.7	103.3	61.3	127.0	95.2	101.0	98.0	102.7	103.0	65.0	131.0	96.4
29	IET 28262	115.0	92.7	102.0	117.7	75.7	111.0	107.0	137.0	97.7	108.3	76.3	79.7	109.0	106.3
30	Local	116.0	97.7	95.0	111.7	74.0	139.0	98.9	122.0	92.7	108.0	111.7	79.3	139.0	102.7
	Mean	**113.9**	**95.8**	**103.6**	**114.5**	**74.6**	**122.3**	**104.1**	**120.3**	**96.0**	**104.7**	**107.4**	**77.9**	**121.5**	**104.6**
	LSD (Treat)			NS					LSD (Treat x Genotype)				NS		
	LSD (Location x Treat)			NS					LSD (Location x Treat x Genotype)				NS		
	LSD (Genotype)			4.78*					CV (%)				12.0		
	LSD (Location x Genotype)			NS											

Table 6.2.3 Screening for elite rice culture for drought tolerance on tiller number/pant flowering at different centres Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigated						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	8.00	4.93	10.33	2.67	6.81	10.7	7.24	11.7	6.53	15.3	5.67	8.00	15.0	10.4
2	IET 28241	8.00	6.60	7.67	2.33	7.15	11.7	7.24	13.7	5.87	12.7	3.33	7.81	15.0	9.7
3	IET 28242	10.33	5.87	24.33	3.33	5.64	14.0	10.58	7.7	6.87	13.3	5.67	6.55	15.0	9.2
4	IET 28243	9.33	4.80	11.33	3.33	6.33	15.7	8.47	17.7	6.13	19.0	7.33	8.33	20.3	13.1
5	IET 28244	8.67	6.07	6.67	4.33	4.88	12.3	7.16	8.0	6.40	10.0	6.67	6.03	16.0	8.8
6	IET 28245	8.33	8.93	4.67	3.67	7.43	11.0	7.34	13.0	6.67	12.7	4.33	7.33	14.0	9.7
7	Sahbhagidhan	7.67	6.47	4.00	3.00	7.32	9.7	6.35	15.0	5.93	11.0	4.67	7.97	11.7	9.4
8	IET 28246	7.67	5.33	3.00	3.33	7.36	12.0	6.45	12.3	6.60	13.7	4.67	8.64	14.7	10.1
9	IET 28247	9.67	4.07	8.67	4.00	9.40	12.0	7.97	18.0	7.13	18.0	4.67	10.01	15.0	12.1
10	IET 28248	7.67	5.53	3.67	4.00	7.52	11.3	6.62	15.7	5.07	11.7	3.33	9.77	13.0	9.8
11	IET 28249	20.00	4.73	4.33	3.67	9.21	12.3	9.05	13.7	5.13	13.0	4.67	10.35	17.7	10.7
12	IET 28250	12.00	4.87	7.33	3.33	8.67	11.0	7.87	17.0	4.80	14.0	6.00	8.99	16.3	11.2
13	Vandana	8.33	6.47	7.33	3.33	8.43	11.7	7.59	13.7	7.07	12.0	3.00	9.27	14.0	9.8
14	IET 28251	11.00	6.20	5.33	3.00	9.13	10.0	7.44	13.7	6.13	15.3	5.33	9.83	13.3	10.6
15	IET 28252	18.00	5.60	4.33	3.00	8.91	12.0	8.64	12.3	6.33	9.3	3.33	8.85	13.7	9.0
16	IET 28253	12.00	5.87	8.00	3.67	9.47	12.7	8.61	13.3	6.00	11.3	3.00	10.01	13.3	9.5
17	IET 28254	12.33	5.60	4.33	4.33	5.72	12.7	7.50	12.7	5.53	8.3	4.33	7.00	11.0	8.1
18	Tulasi	11.67	5.40	4.00	4.33	9.09	10.0	7.42	9.7	5.40	10.7	3.67	10.31	11.7	8.6
19	IET 28255	10.00	5.07	4.33	3.00	8.57	14.3	7.55	11.7	6.60	10.0	4.00	9.16	16.0	9.6
20	IET 28256	11.67	4.60	6.00	4.00	8.36	12.7	7.88	14.3	5.27	10.7	4.67	8.97	15.0	9.8
21	US 314	7.67	4.80	7.33	5.67	5.27	14.7	7.57	11.3	6.07	13.3	4.67	5.68	20.0	10.2
22	IET 28257	18.67	6.00	4.33	3.00	5.56	14.3	8.65	12.0	6.00	11.0	5.33	6.28	17.7	9.7
23	IET 28258	7.33	7.47	4.33	3.00	8.33	12.0	7.08	10.7	6.07	14.3	4.00	9.69	13.3	9.7
24	IET 28259	10.67	5.73	5.00	4.00	9.36	12.7	7.90	10.3	5.87	12.0	5.33	10.24	14.3	9.7
25	IET 28260	7.00	6.07	7.67	2.67	8.48	11.3	7.20	9.7	5.47	10.0	4.33	9.49	13.3	8.7
26	Gangavathi Ageti	5.67	8.47	8.67	5.33	5.97	14.3	8.07	11.7	7.87	16.3	5.00	6.79	15.3	10.5
27	IET 28261	8.00	7.47	13.67	3.00	8.17	12.7	8.83	10.3	7.13	13.7	5.00	8.00	15.7	10.0
28	Anjali	4.67	4.73	5.00	2.33	7.67	11.3	5.96	12.7	7.33	15.3	3.00	10.09	14.0	10.4
29	IET 28262	12.33	6.33	5.00	4.67	6.39	14.0	8.12	11.3	6.40	13.3	4.00	8.03	18.3	10.2
30	Local	9.33	4.20	6.33	3.00	7.48	15.7	7.67	11.0	7.07	11.0	4.00	9.05	20.7	10.5
	Mean	**10.12**	**5.81**	**6.90**	**3.54**	**7.60**	**12.4**	**7.73**	**12.5**	**6.22**	**12.7**	**4.57**	**8.55**	**15.1**	**10.0**
	LSD (Treat)				0.26*				LSD (Treat x Genotype)				1.47*		
	LSD (Location x Treat)				0.86**				LSD (Location x Treat x Genotype)				NS		
	LSD (Genotype)				NS				CV (%)				25.3		
	LSD (Location x Genotype)				3.39**										

Table 6.2.4 Screening for elite rice culture for drought tolerance on shoot weight (g/m2) at different centres Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigated						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	713	304	270	758	567	630	540	830	318	1005	806	591	2314	977
2	IET 28241	712	282	208	804	703	592	550	818	400	1704	694	737	2376	1121
3	IET 28242	614	238	284	714	527	666	507	698	398	1512	704	553	2084	992
4	IET 28243	607	278	259	669	687	532	506	698	317	1335	737	717	1958	960
5	IET 28244	706	286	303	618	421	1224	593	821	444	952	686	458	2538	983
6	IET 28245	633	150	190	567	733	484	460	735	291	552	690	758	2634	944
7	Sahbhagidhan	817	225	189	652	699	681	544	939	353	911	748	727	3037	1119
8	IET 28246	819	242	213	646	724	1291	656	931	375	1183	710	751	1836	964
9	IET 28247	805	475	174	751	601	1415	703	958	441	1017	741	641	2153	992
10	IET 28248	832	251	318	839	715	751	618	946	457	984	700	747	2147	997
11	IET 28249	793	402	316	852	700	1213	712	933	468	1009	806	740	2204	1026
12	IET 28250	685	263	416	716	717	1123	653	796	377	784	774	742	2434	984
13	Vandana	684	315	132	654	670	752	534	796	323	1387	760	715	1211	865
14	IET 28251	814	331	344	613	730	848	613	936	455	952	722	742	2137	991
15	IET 28252	738	615	340	679	682	1413	745	838	620	1407	782	707	2469	1137
16	IET 28253	603	206	307	699	524	821	527	708	444	857	733	544	1434	787
17	IET 28254	604	309	299	682	589	979	577	702	570	560	735	639	2637	974
18	Tulasi	621	466	316	720	646	1329	683	723	525	811	678	687	2842	1044
19	IET 28255	621	458	261	773	535	1015	611	714	526	1223	701	557	3634	1226
20	IET 28256	606	269	165	708	766	526	507	704	364	994	725	789	2152	955
21	US 314	511	332	363	613	752	825	566	600	533	995	778	775	1556	873
22	IET 28257	522	527	279	661	587	816	565	600	496	874	682	632	2543	971
23	IET 28258	614	291	168	777	661	822	556	708	550	1872	680	690	1146	941
24	IET 28259	519	491	280	645	555	944	572	632	481	908	664	601	2018	884
25	IET 28260	678	399	231	771	672	917	611	779	450	709	647	697	1820	850
26	Gangavathi Ageti	665	217	225	653	581	724	511	773	289	593	669	625	1337	714
27	IET 28261	568	374	496	627	602	1361	671	661	454	880	675	617	2444	955
28	Anjali	568	244	536	639	485	653	521	660	418	791	640	511	1263	714
29	IET 28262	653	511	467	637	667	1073	668	777	637	1085	543	692	2328	1010
30	Local	585	165	493	621	521	721	518	696	402	1144	620	565	1156	764
	Mean	**664**	**331**	**295**	**692**	**634**	**905**	**587**	**770**	**439**	**1033**	**708**	**665**	**2128**	**957**
	LSD (Treat)			NS					LSD (Treat x Genotype)			NS			
	LSD (Location x Treat)			36.2**					LSD (Location x Treat x Genotype)			NS			
	LSD (Genotype)			NS					CV(%)			12.18			
	LSD (Location x Genotype)			140.2**											

Table 6.2.5 Screening for elite rice culture for drought tolerance on panicle number/m2 at different centres Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigation						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	188.2	192.0	146.0	176.3	78.7	266.7	174.7	231.0	286.7	293.7	161.0	110.0	375.0	242.9
2	IET 28241	174.2	196.5	176.3	103.0	168.7	291.7	185.1	214.0	265.0	231.0	134.3	205.3	375.0	237.4
3	IET 28242	175.4	196.5	193.3	112.7	34.7	350.0	177.1	215.3	261.7	279.7	139.3	68.0	375.0	223.2
4	IET 28243	222.7	227.6	233.0	171.3	163.7	391.7	235.0	273.3	291.7	230.7	174.7	202.0	508.3	280.1
5	IET 28244	178.4	215.3	110.3	150.7	42.0	308.3	167.5	219.0	288.3	249.3	130.3	52.3	400.0	223.2
6	IET 28245	208.8	220.9	154.7	103.7	58.3	275.0	170.2	256.3	313.3	214.3	123.7	74.7	350.0	222.1
7	Sahbhagidhan	193.6	204.2	168.0	148.0	108.0	241.7	177.3	237.7	308.3	210.0	157.7	129.3	291.7	222.4
8	IET 28246	183.3	223.1	127.3	124.0	127.7	300.0	180.9	225.0	291.7	301.3	138.3	150.0	366.7	245.5
9	IET 28247	182.1	216.5	156.3	167.3	179.0	300.0	200.2	223.3	360.0	269.0	184.7	198.3	375.0	268.4
10	IET 28248	230.0	167.6	215.7	125.0	169.3	283.3	198.5	283.0	225.0	218.0	144.3	194.7	325.0	231.7
11	IET 28249	186.9	176.5	71.3	187.7	145.7	308.3	179.4	229.0	268.3	182.3	182.7	173.0	441.7	246.2
12	IET 28250	162.6	192.0	210.0	133.7	141.7	275.0	185.8	199.3	288.3	229.3	158.0	177.0	408.3	243.4
13	Vandana	202.1	189.8	125.0	122.0	125.7	291.7	176.0	248.7	283.3	239.3	169.7	150.0	350.0	240.2
14	IET 28251	192.4	273.1	214.0	142.3	153.3	250.0	204.2	236.0	293.3	280.0	164.0	176.7	333.3	247.2
15	IET 28252	189.3	178.7	124.7	146.7	147.7	300.0	181.2	232.0	278.3	257.3	140.3	164.0	341.7	235.6
16	IET 28253	237.3	179.8	131.3	116.0	161.7	316.7	190.5	291.0	236.7	256.3	175.0	180.0	333.3	245.4
17	IET 28254	196.0	184.3	122.0	182.3	68.0	316.7	178.2	240.7	226.7	176.0	171.7	90.3	275.0	196.7
18	Tulasi	174.8	166.5	116.0	154.7	185.0	250.0	174.5	214.3	280.0	146.0	189.0	209.3	291.7	221.7
19	IET 28255	193.6	209.8	121.0	178.3	139.3	358.3	200.1	237.7	321.7	235.0	197.3	166.7	400.0	259.7
20	IET 28256	201.5	196.5	153.7	167.7	122.3	316.7	193.0	247.3	320.0	247.7	170.0	153.7	375.0	252.3
21	US 314	196.0	205.4	240.7	158.3	56.7	366.7	204.0	240.7	271.7	237.0	176.3	68.3	500.0	249.0
22	IET 28257	245.8	195.4	122.3	176.7	58.3	358.3	192.8	301.7	238.3	188.3	175.0	82.7	441.7	237.9
23	IET 28258	204.5	202.0	102.3	150.0	159.3	300.0	186.4	250.7	285.0	254.3	151.0	186.7	333.3	243.5
24	IET 28259	185.7	169.8	102.0	167.0	153.0	316.7	182.4	228.0	265.0	168.3	186.3	183.3	358.3	231.6
25	IET 28260	195.4	172.1	220.3	168.0	137.0	283.3	196.0	240.0	293.3	240.3	200.3	180.3	333.3	247.9
26	Gangavathi Ageti	183.3	227.6	154.7	182.3	59.3	358.3	194.2	225.0	350.0	331.3	159.3	76.7	383.3	254.3
27	IET 28261	184.5	199.8	192.7	153.7	120.7	316.7	194.7	226.3	325.0	226.3	153.7	189.0	391.7	252.0
28	Anjali	234.3	199.8	179.7	116.3	80.0	283.3	182.2	287.3	255.0	190.7	116.7	210.7	350.0	235.1
29	IET 28262	187.5	217.6	126.3	132.3	84.7	350.0	183.1	230.0	281.7	211.0	179.3	142.7	458.3	250.5
30	Local	219.7	184.3	171.0	186.3	107.3	391.7	210.0	269.7	208.3	219.0	191.3	136.7	516.7	256.9
	Mean	197.0	199.4	156.1	150.1	117.9	310.6	188.5	241.8	282.1	233.8	163.2	149.4	378.6	241.5
	LSD (Treat)				ns				LSD (Treat x Genotype)				ns		
	LSD (Location x Treat)				12.0**				LSD (Location x Treat x Genotype)				ns		
	LSD (Genotype)				ns				CV(%)				14.6		
	LSD (Location x Genotype)				46.4**										

Table 6.2.6 Screening for elite rice culture for drought tolerance on grain number/panicle at different centres Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigation						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	66	77	23	152	39	120	79	83	163	54	159	92	150	117
2	IET 28241	50	88	44	165	109	97	92	60	96	127	176	136	176	129
3	IET 28242	48	67	14	157	57	126	78	73	108	125	171	83	153	119
4	IET 28243	79	102	11	164	86	99	90	94	134	150	151	120	141	132
5	IET 28244	45	92	12	195	94	138	96	64	116	103	153	104	158	116
6	IET 28245	52	75	8	190	84	117	88	49	85	80	197	99	193	117
7	Sahbhagidhan	87	94	20	169	110	114	99	75	114	146	138	130	211	136
8	IET 28246	57	92	41	157	83	152	97	86	98	133	173	104	147	123
9	IET 28247	75	72	25	154	97	145	95	53	118	135	180	115	158	126
10	IET 28248	68	77	11	141	77	118	82	47	118	87	148	101	143	107
11	IET 28249	39	64	5	175	99	139	87	97	100	60	161	125	139	114
12	IET 28250	65	78	7	151	83	142	88	62	117	71	168	117	168	117
13	Vandana	46	55	3	157	119	117	83	36	95	35	144	142	136	98
14	IET 28251	68	93	3	133	118	152	94	65	134	102	172	140	145	126
15	IET 28252	82	105	38	165	89	153	105	172	158	138	195	104	140	151
16	IET 28253	86	74	28	165	83	123	93	100	119	65	158	100	120	110
17	IET 28254	63	65	16	161	107	145	93	68	139	66	150	128	161	119
18	Tulasi	74	89	7	180	78	156	97	71	83	137	185	101	175	125
19	IET 28255	80	90	17	182	114	150	106	113	170	79	181	140	188	145
20	IET 28256	100	107	32	170	62	113	97	85	131	105	175	92	143	122
21	US 314	100	145	43	147	101	116	109	79	209	84	174	113	123	130
22	IET 28257	73	81	10	168	105	121	93	22	169	134	169	128	158	130
23	IET 28258	69	94	21	152	105	127	95	49	150	78	164	131	113	114
24	IET 28259	57	84	8	183	86	142	93	47	123	69	170	115	122	107
25	IET 28260	56	65	6	197	71	130	87	72	128	74	149	113	137	112
26	Gangavathi Ageti	55	73	11	139	104	124	84	44	79	70	178	120	122	102
27	IET 28261	93	94	157	160	74	151	122	58	124	92	166	141	168	125
28	Anjali	47	106	85	186	43	114	97	52	96	147	146	130	204	129
29	IET 28262	83	71	167	141	75	129	111	79	164	117	151	126	128	127
30	Local	59	92	118	157	103	103	105	59	141	101	122	131	115	112
	Mean	**67**	**85**	**33**	**164**	**89**	**129**	**95**	**70**	**126**	**99**	**164**	**117**	**151**	**121**
	LSD (Treat)				2.76*				LSD (Treat x Genotype)				NS		
	LSD (Location x Treat)				8.91**				LSD (Location x Treat x Genotype)				NS		
	LSD (Genotype)				NS				CV(%)				21.5		
	LSD (Location x Genotype)				34.54**										

Table 6.2.7 Screening for elite rice culture for drought tolerance on spikelet number/panicle at different centres Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigation						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	71	130	90	79.7	80	11.3	77	93	201	92	76.7	112	13.3	98
2	IET 28241	55	121	195	79.0	151	12.3	102	68	109	141	82.3	143	14.3	93
3	IET 28242	53	106	146	80.3	111	13.3	85	82	119	148	83.3	119	16.0	95
4	IET 28243	86	167	134	80.3	125	13.3	101	106	168	171	80.0	162	17.3	117
5	IET 28244	49	131	27	73.7	157	13.7	75	72	140	159	81.3	132	15.7	100
6	IET 28245	57	106	43	77.0	148	12.3	74	55	93	124	85.3	140	14.3	85
7	Sahbhagidhan	95	131	99	80.3	170	13.7	98	85	130	168	83.0	157	15.7	107
8	IET 28246	62	114	115	74.7	126	12.0	84	97	113	160	85.7	130	14.7	100
9	IET 28247	82	128	107	76.0	195	12.3	100	60	155	161	87.7	163	12.7	107
10	IET 28248	74	100	20	77.0	122	11.7	67	53	136	113	87.0	140	14.3	91
11	IET 28249	42	96	56	78.7	133	13.7	70	109	138	84	80.3	184	16.0	102
12	IET 28250	70	124	30	82.3	116	13.0	73	70	133	128	83.7	174	15.3	101
13	Vandana	50	78	18	82.3	158	11.3	66	41	106	78	86.7	186	10.7	85
14	IET 28251	74	146	22	86.0	161	13.7	84	73	156	120	85.3	194	18.3	108
15	IET 28252	89	136	127	85.7	111	12.3	93	194	181	157	79.0	159	14.3	131
16	IET 28253	94	114	132	84.3	112	13.3	92	113	129	110	79.0	165	12.0	101
17	IET 28254	68	99	127	76.0	153	13.7	89	77	183	82	82.0	177	12.7	102
18	Tulasi	81	129	78	80.7	126	11.3	84	80	116	161	80.7	141	14.7	99
19	IET 28255	87	145	133	81.0	154	13.0	102	127	215	108	78.0	184	13.7	121
20	IET 28256	109	142	138	87.7	92	11.7	97	96	169	113	81.3	119	14.3	99
21	US 314	109	197	62	81.0	129	13.7	99	89	233	145	85.7	130	16.0	116
22	IET 28257	79	139	92	77.3	138	12.0	90	24	191	156	82.0	136	14.3	101
23	IET 28258	75	119	64	84.7	143	11.7	83	56	195	86	73.7	207	10.3	105
24	IET 28259	62	132	26	83.0	121	13.7	73	53	171	105	79.3	148	13.7	95
25	IET 28260	61	114	23	80.3	99	12.3	65	81	162	89	80.0	121	15.0	91
26	Gangavathi Ageti	60	88	174	80.0	127	11.7	90	50	92	98	81.7	135	13.0	78
27	IET 28261	101	139	184	77.7	95	12.7	101	66	169	127	81.7	177	13.7	106
28	Anjali	52	136	101	76.3	83	14.0	77	58	102	169	89.0	163	13.0	99
29	IET 28262	90	129	174	82.0	111	12.7	100	89	204	143	86.0	153	11.7	114
30	Local	64	134	222	78.7	135	11.7	108	66	166	120	78.7	141	13.3	98
	Mean	**73**	**126**	**99**	**80.1**	**129**	**12.6**	**87**	**80**	**152**	**127**	**82.2**	**153**	**14.1**	**101**
	LSD (Treat)				3.31*				LSD (Treat x Genotype)					ns	
	LSD (Location x Treat)				1067**				LSD (Location x Treat x Genotype)					ns	
	LSD (Genotype)				ns				CV (%)					29.4	
	LSD (Location x Genotype)				41.35**										

Table 6.2.8 Screening for elite rice culture for drought tolerance on grain number/m2 at different centers Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigation						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	12305	21811	3572	27564	3063	31900	16703	19080	30230	17086	25996	10111	56100	26434
2	IET 28241	8801	23241	8787	16864	18345	28200	17373	12889	19925	30982	23729	27923	65783	30205
3	IET 28242	8516	17617	3184	17599	1969	43942	15471	15544	20973	29691	23062	6667	57275	25535
4	IET 28243	17597	29343	2533	28076	14094	38667	21718	25557	30678	33571	26710	24155	71517	35365
5	IET 28244	8050	26594	1180	29273	3955	42517	18595	13986	24703	28018	20788	5464	63092	26008
6	IET 28245	10931	23985	1265	18848	4923	32208	15360	12632	18961	19900	24421	7426	67450	25132
7	Sahbhagidhan	16854	28923	3459	25958	11945	27483	19104	17902	23346	30145	21888	16874	61633	28631
8	IET 28246	10463	27022	6475	19957	10573	45675	20027	19287	21939	40633	24234	15571	53875	29257
9	IET 28247	13628	26066	4558	26356	17344	43617	21928	11816	25569	36530	33315	22736	59108	31512
10	IET 28248	15773	17282	2379	16961	13087	33300	16464	13372	20044	19349	21237	19729	46408	23357
11	IET 28249	7429	17101	387	32770	14441	42733	19144	22192	17557	11047	29687	21642	61517	27274
12	IET 28250	10650	22681	1518	21110	11804	39125	17815	12407	22509	16936	26404	20762	68708	27954
13	Vandana	9249	15503	471	19569	14916	34192	15650	9049	18124	7901	24134	21247	47417	21312
14	IET 28251	13032	27125	638	18656	18109	38100	19277	15287	36904	28521	28266	24776	48150	30317
15	IET 28252	15486	29323	5097	24365	13092	45750	22186	39806	28178	36340	27513	17033	47767	32773
16	IET 28253	20546	17553	4072	18927	13359	38908	18894	29125	21415	16767	28450	17915	40117	25631
17	IET 28254	12253	14692	1573	29471	7284	45742	18502	16396	25469	11813	26149	11564	44367	22626
18	Tulasi	12972	24825	736	27776	14472	39058	19973	15202	13396	21166	35045	21196	51133	26190
19	IET 28255	15662	29087	1669	32750	15910	53767	24807	26801	34928	16010	35690	23386	75067	35314
20	IET 28256	20263	34110	5030	29119	7550	35850	21987	21007	25415	24030	29582	14100	53650	27964
21	US 314	19659	39389	10416	23265	5779	42417	23488	18918	42227	19979	31538	7718	61417	30299
22	IET 28257	17911	19137	1220	30903	6146	43250	19761	6521	33443	25137	29974	10626	69800	29250
23	IET 28258	14114	26889	2247	22839	16731	38000	20137	12440	29807	20011	24940	24464	37575	24873
24	IET 28259	10696	22241	749	30710	13115	45008	20420	10688	20934	10775	31698	21062	43717	23146
25	IET 28260	10881	18931	834	33387	9673	36783	18415	17167	22092	17537	29911	20353	45700	25460
26	Gangavathi Ageti	10162	25421	1605	24737	6148	44467	18757	9993	18186	23079	28420	9175	46767	22603
27	IET 28261	17035	30211	28935	24501	8851	47933	26244	13281	24674	21973	25840	26760	65800	29721
28	Anjali	11033	26946	16029	21117	3364	32317	18468	14861	18970	28605	17319	27484	71517	29793
29	IET 28262	15456	20229	22155	19266	6272	45267	21441	18173	34951	24258	26609	17908	58767	30111
30	Local	12858	19082	17105	29182	11106	40342	21612	15877	25710	22694	23315	17971	59442	27501
	Mean	**13342**	**24079**	**5329**	**24729**	**10581**	**39884**	**19657**	**16908**	**25042**	**23016**	**26862**	**17793**	**56688**	**27718**
	LSD (Treat)				714*				LSD (Treat x Genotype)				ns		
	LSD (Location x Treat)				2301**				LSD (Location x Treat x Genotype)				ns		
	LSD (Genotype)				3639**				CV (%)				25.34		
	LSD (Location x Genotype)				8914**										

Table 6.2.9 Screening for elite rice culture for drought tolerance on spikelet number/m2 at different centres Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigation						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	13412	37175	14814	13983	6310	3017	14785	21561	37384	27937	12365	12332	4992	19428
2	IET 28241	9593	31894	16513	8030	25395	3600	15837	14564	22552	34223	11042	29293	5367	19507
3	IET 28242	9282	27687	24433	9290	3843	4667	13200	17565	23139	35539	11696	8063	6000	17000
4	IET 28243	19181	48218	30594	13765	20415	5217	22898	28879	38482	38260	13902	32649	8833	26834
5	IET 28244	8775	37879	3102	11138	6607	4208	11952	15805	29981	40038	10584	6905	6275	18264
6	IET 28245	11915	33549	6551	8021	8658	3383	12013	14274	20884	30829	10599	10460	5017	15344
7	Sahbhagidhan	18371	40329	16026	11729	18408	3300	18027	20229	26459	34732	12802	20387	4567	19863
8	IET 28246	11405	33423	17225	9160	16058	3608	15146	21794	25099	48597	11837	19529	5375	22039
9	IET 28247	14855	46362	15936	12605	34843	3717	21386	13352	33596	43529	16049	32328	4742	23933
10	IET 28248	17192	22351	4321	9706	20708	3300	12930	15111	23129	25098	12515	27323	4650	17971
11	IET 28249	8097	25936	3970	14795	19386	4208	12732	25076	24270	16009	14629	31842	7067	19816
12	IET 28250	11608	35801	5810	11259	16476	3575	14088	14019	25500	29670	13177	30879	6250	19916
13	Vandana	10081	22179	2472	10158	19814	3333	11340	10225	20271	19614	14802	27792	3717	16070
14	IET 28251	14204	42617	5230	12286	24724	3425	17081	17275	42870	33696	13940	34408	6092	24713
15	IET 28252	16880	38276	16118	12420	16374	3717	17298	44981	32394	41742	11148	26138	4892	26882
16	IET 28253	22395	27068	16041	9683	18039	4250	16246	32911	23328	28018	13788	29688	4000	21956
17	IET 28254	13356	22506	14177	13893	10396	4367	13116	18527	33545	14733	14136	16071	3483	16749
18	Tulasi	14139	35912	9178	12552	23358	2833	16329	17178	18680	24762	15239	29488	4283	18272
19	IET 28255	17072	46941	14038	14661	21494	4650	19809	30285	43885	20330	15251	30599	5467	24303
20	IET 28256	22086	45353	22000	14777	11216	3675	19851	23738	32837	26071	13848	18294	5367	20026
21	US 314	21428	53472	14777	12788	7287	5017	19128	21377	47165	34571	15257	8887	8000	22543
22	IET 28257	19523	33042	11694	13677	8085	4317	15056	7369	37808	28748	14610	11238	6333	17684
23	IET 28258	15384	33974	6749	12719	22793	3500	15853	14057	38623	22061	11102	38580	3458	21313
24	IET 28259	11658	35138	2730	13819	18495	4342	14364	12078	29023	15756	14699	27240	4892	17281
25	IET 28260	11860	33511	3009	13513	13542	3492	13154	19399	28009	21027	15941	21757	5000	18522
26	Gangavathi Ageti	11076	30701	26967	14525	7517	4183	15828	11293	21116	32194	13033	10394	4983	15502
27	IET 28261	18568	44971	33439	11933	11464	4025	20733	15007	33715	29956	12284	33532	5350	21641
28	Anjali	12026	34677	19037	8841	6611	3967	14193	16793	20188	32744	10461	34554	4550	19882
29	IET 28262	16847	36421	23005	10703	9330	4450	16793	20535	43755	30399	15480	21811	5342	22887
30	Local	14015	27860	32427	14690	14543	4567	18017	17941	30145	26753	15187	19292	6892	19368
	Mean	**14543**	**35507**	**14413**	**12037**	**15406**	**3930**	**15973**	**19107**	**30261**	**29588**	**13380**	**23392**	**5374**	**20184**
	LSD (Treat)				ns				LSD (Treat x Genotype)				ns		
	LSD (Location x Treat)				2316**				LSD (Location x Treat x Genotype)				ns		
	LSD (Genotype)				2784*				CV(%)				23.3		
	LSD (Location x Genotype)				8972**										

Table 6.2.10 Screening for elite rice culture for drought tolerance on grain yield (g/m2) at different centres Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigation						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	784	285	70	229	508	340	369	911	306	668	250	550	446	522
2	IET 28241	387	251	44	208	628	398	319	478	343	416	260	700	548	458
3	IET 28242	449	303	147	240	457	472	345	554	402	814	365	498	674	551
4	IET 28243	779	330	50	323	623	439	424	906	407	510	323	673	744	594
5	IET 28244	500	290	63	281	407	440	330	562	458	618	354	446	680	520
6	IET 28245	454	328	54	167	671	390	344	528	348	441	260	730	585	482
7	Sahbhagidhan	711	378	56	240	611	439	406	799	431	467	365	690	630	564
8	IET 28246	707	291	74	219	638	358	381	822	349	478	323	704	519	533
9	IET 28247	448	403	78	344	504	377	359	493	439	493	417	610	463	486
10	IET 28248	418	329	68	250	496	355	319	470	365	280	302	704	504	437
11	IET 28249	732	243	34	354	665	403	405	851	409	369	344	714	639	554
12	IET 28250	424	336	68	323	640	385	363	466	393	489	365	703	639	509
13	Vandana	370	247	25	135	599	306	281	407	271	241	167	679	281	341
14	IET 28251	533	328	72	313	638	426	385	519	570	564	365	689	823	588
15	IET 28252	1108	276	73	354	557	372	457	1217	493	572	292	665	531	628
16	IET 28253	774	296	67	167	412	403	353	850	359	381	281	498	362	455
17	IET 28254	642	230	47	333	507	428	365	747	423	268	229	608	427	450
18	Tulasi	484	363	68	406	533	364	370	597	404	337	365	652	562	486
19	IET 28255	857	221	46	406	399	392	387	1006	400	814	313	509	497	590
20	IET 28256	674	368	66	323	727	309	411	904	408	456	281	761	522	555
21	US 314	585	426	108	469	686	415	448	763	607	605	438	729	670	635
22	IET 28257	274	257	52	438	513	382	319	338	423	608	406	585	555	486
23	IET 28258	431	312	39	229	616	349	329	501	526	398	229	657	296	434
24	IET 28259	436	327	36	313	511	414	339	490	456	357	333	561	474	445
25	IET 28260	612	279	61	375	606	394	388	688	495	482	396	644	582	548
26	Gangavathi Ageti	440	279	26	250	510	317	304	512	292	312	375	569	390	408
27	IET 28261	475	358	142	229	499	392	349	571	483	570	198	577	490	482
28	Anjali	515	337	67	135	394	418	311	635	459	391	198	461	431	429
29	IET 28262	720	213	102	260	561	376	372	847	533	467	240	667	405	526
30	Local	498	255	96	240	430	322	307	618	411	517	323	534	441	474
	Mean	**574**	**305**	**67**	**285**	**552**	**386**	**361**	**668**	**422**	**479**	**312**	**626**	**527**	**506**
	LSD (Treat)				11.17*				LSD (Treat x Genotype)				ns		
	LSD (Location x Treat)				36.01**				LSD (Location x Treat x Genotype)				ns		
	LSD (Genotype)				43.28*				CV(%)				21.6		
	LSD (Location x Genotype)				139**										

Table 6.2.11 Screening for elite rice culture for drought tolerance on 1000 grain weight (g) at different centres Kharif 2019

S.No.	Genotypes	Drought						Grand Mean	Irrigation						Grand Mean
		CBT	NRRI	PTB	RANCHI	REWA	RPR		CBT	NRRI	PTB	RANCHI	REWA	RPR	
1	IET 28240	19.4	20.1	5.0	22.0	25.3	22.4	19.1	21.0	19.8	22.7	19.3	26.7	22.7	22.0
2	IET 28241	23.8	24.4	5.9	21.6	27.9	27.7	21.9	26.8	26.1	23.7	22.6	30.2	27.9	26.2
3	IET 28242	27.6	28.2	13.3	21.8	25.7	28.5	24.2	27.9	27.9	25.0	24.4	27.3	30.5	27.2
4	IET 28243	19.7	19.2	5.8	22.8	25.3	19.7	18.8	21.4	19.6	25.0	20.9	27.3	21.9	22.7
5	IET 28244	27.0	22.6	8.3	22.6	20.4	24.9	21.0	24.8	25.4	24.0	19.5	24.1	25.6	23.9
6	IET 28245	22.7	22.6	5.1	22.3	19.7	25.3	19.6	24.3	23.4	24.3	22.1	22.1	26.1	23.7
7	Sahbhagidhan	23.9	22.2	8.7	23.1	25.7	22.8	21.1	22.5	21.6	21.7	21.7	29.7	24.3	23.6
8	IET 28246	20.9	22.0	14.1	23.9	28.2	21.2	21.7	23.6	20.3	23.3	20.6	31.5	21.4	23.5
9	IET 28247	26.0	24.6	9.8	27.9	27.3	25.5	23.5	23.9	25.0	25.0	20.5	29.3	28.4	25.4
10	IET 28248	24.8	23.5	3.3	26.8	21.5	27.5	21.2	28.9	26.0	25.0	21.3	25.2	27.7	25.7
11	IET 28249	21.4	23.4	2.5	19.1	21.9	27.3	19.3	26.2	28.0	24.0	21.3	24.5	29.6	25.6
12	IET 28250	25.5	24.1	4.1	23.1	26.2	26.3	21.6	26.9	24.4	25.0	22.8	27.7	27.5	25.7
13	Vandana	18.9	22.6	4.8	26.5	34.1	24.3	21.9	22.4	24.8	24.3	24.3	37.1	25.9	26.5
14	IET 28251	22.6	23.2	9.0	24.6	26.4	25.1	21.8	24.7	22.9	22.7	22.4	28.0	25.1	24.3
15	IET 28252	17.7	14.7	15.0	24.4	25.2	19.0	19.3	18.8	18.6	22.0	24.3	28.9	19.1	22.0
16	IET 28253	19.4	21.9	10.8	26.6	25.9	25.5	21.7	25.6	25.1	23.3	26.8	28.5	26.4	26.0
17	IET 28254	22.2	21.4	8.5	21.2	26.6	25.4	20.9	22.3	25.1	24.0	21.9	30.3	27.2	25.1
18	Tulasi	20.9	29.9	12.6	23.5	20.1	30.6	22.9	26.1	32.6	19.3	25.2	23.8	32.2	26.5
19	IET 28255	19.6	13.4	6.4	19.3	28.8	16.7	17.4	22.2	16.7	24.0	21.5	31.4	17.3	22.2
20	IET 28256	20.8	23.1	11.7	24.6	18.4	23.7	20.4	22.4	21.7	23.3	25.1	18.7	23.8	22.5
21	US 314	20.8	21.2	10.0	22.9	28.0	18.2	20.2	24.1	20.9	23.3	21.1	29.9	24.4	24.0
22	IET 28257	21.1	20.5	5.3	21.4	24.7	25.7	19.8	20.3	20.9	25.0	25.1	26.2	25.8	23.9
23	IET 28258	20.2	23.3	8.2	25.8	27.4	25.5	21.7	24.8	24.6	25.0	26.3	29.0	28.6	26.4
24	IET 28259	21.4	22.1	2.5	20.7	26.7	25.2	19.8	21.9	24.8	23.0	20.1	27.9	28.1	24.3
25	IET 28260	21.8	24.3	10.0	22.9	17.5	25.3	20.3	24.9	24.5	21.0	26.3	17.8	25.8	23.4
26	Gangavathi Ageti	17.6	18.8	4.3	21.8	28.2	19.6	18.4	20.0	18.0	22.0	23.0	30.5	19.7	22.2
27	IET 28261	16.3	20.5	12.5	20.8	25.6	21.2	19.5	23.0	20.9	24.0	23.5	27.9	21.7	23.5
28	Anjali	23.6	24.8	12.2	23.7	21.3	25.8	21.9	23.8	24.9	23.0	27.7	24.6	30.8	25.8
29	IET 28262	19.7	14.7	16.4	24.0	20.1	16.3	18.5	21.7	19.9	25.0	20.5	22.4	21.3	21.8
30	Local	21.1	21.7	19.7	19.5	19.5	23.6	20.8	26.8	21.8	24.0	26.4	21.5	22.5	23.8
	Mean	**21.6**	**22.0**	**8.9**	**23.0**	**24.7**	**23.9**	**20.7**	**23.8**	**23.2**	**23.6**	**23.0**	**27.0**	**25.3**	**24.3**
	LSD (Treat)				ns				LSD (Treat x Genotype)				ns		
	LSD (Location x Treat)				1.07**				LSD (Location x Treat x Genotype)				ns		
	LSD (Genotype)				1.29*				CV(%)				12.4		
	LSD (Location x Genotype)				1.70**										

Table 6.2.12 Screening for elite rice culture for drought tolerance on Stability statistics at different centres Kharif 2019

S.No.	Genotypes	Mean	Sigma-square	.	s-square	.	Ecovalence
1	IET 28240	369.3	32004.1	**	33273.9	**	153656.5
2	IET 28241	319.5	24676.3	*	30729.5	**	119460.3
3	IET 28242	344.6	24005.9	*	12625.2	ns	116331.5
4	**IET 28243**	**424.2**	**17595.8**	**ns**	**6468.5**	**ns**	**86417.6**
5	IET 28244	330.3	14287.4	ns	11071.2	ns	70978.7
6	IET 28245	343.9	25871.2	*	32265.2	**	125036.1
7	Sahbhagidhan	405.8	12431.1	ns	7007.3	ns	62316.0
8	IET 28246	381.2	17144.1	ns	11496.0	ns	84309.7
9	IET 28247	358.9	19246.5	ns	13352.1	ns	94121.1
10	IET 28248	319.3	11709.4	ns	6313.9	ns	58947.8
11	IET 28249	405.0	22333.6	*	10010.6	ns	108527.5
12	IET 28250	362.7	20143.5	*	23609.5	*	98306.9
13	Vandana	280.6	23741.1	*	29563.5	**	115095.6
14	IET 28251	384.8	4682.9	ns	6082.2	ns	26157.4
15	IET 28252	456.7	150799.7	**	135576.0	**	708036.0
16	IET 28253	353.1	46324.5	**	55208.6	**	220485.1
17	IET 28254	364.7	9714.2	ns	11612.0	ns	49636.8
18	Tulasi	369.6	16159.1	ns	14591.1	ns	79712.9
19	IET 28255	386.8	77190.4	**	91839.6	**	364526.0
20	IET 28256	411.1	22989.1	*	19257.1	ns	111586.3
21	US 314	448.0	14590.6	ns	18436.7	ns	72393.5
22	IET 28257	319.3	67725.6	**	58878.8	**	320356.9
23	IET 28258	329.2	14460.5	ns	18137.9	ns	71786.3
24	IET 28259	339.5	12426.7	ns	11578.3	ns	62295.2
25	IET 28260	387.6	4883.0	ns	5386.1	ns	27091.6
26	Gangavathi Ageti	303.6	4248.9	ns	3412.8	ns	24132.1
27	IET 28261	349.1	14068.7	ns	5736.7	ns	69957.9
28	Anjali	311.0	23188.2	*	24566.1	*	112515.7
29	IET 28262	372.0	19103.6	ns	20262.7	ns	93454.2
30	Local	306.7	6974.4	ns	512.7	ns	36851.3

Signif. codes: 0 '**' 0.01 '*' 0.05 'ns' 1

Table 6.2.13 Simultaneous selection for yield and stability (++) at different centres Kharif 2019

S.No.	Genotypes	Yield	Rank Adj.	rank	Adjusted	Stab.var	Stab.rating	YSi	...
1	IET 28240	369.3	18.0	1.0	19.0	32004.1	-8.0	11.0	
2	IET 28241	319.5	7.0	-1.0	6.0	24676.3	-4.0	2.0	
3	IET 28242	344.6	12.0	-1.0	11.0	24005.9	-4.0	7.0	
4	**IET 28243**	**424.2**	**28.0**	**2.0**	**30.0**	**17595.8**	**0.0**	**30.0**	**+**
5	IET 28244	330.3	9.0	-1.0	8.0	14287.4	0.0	8.0	
6	IET 28245	343.9	11.0	-1.0	10.0	25871.2	-4.0	6.0	
7	**Sahbhagidhan**	**405.8**	**26.0**	**1.0**	**27.0**	**12431.1**	**0.0**	**27.0**	**+**
8	**IET 28246**	**381.2**	**21.0**	**1.0**	**22.0**	**17144.1**	**0.0**	**22.0**	**+**
9	**IET 28247**	**358.9**	**15.0**	**-1.0**	**14.0**	**19246.5**	**0.0**	**14.0**	**+**
10	IET 28248	319.3	5.0	-1.0	4.0	11709.4	0.0	4.0	
11	**IET 28249**	**405.0**	**25.0**	**1.0**	**26.0**	**22333.6**	**-4.0**	**22.0**	**+**
12	IET 28250	362.7	16.0	1.0	17.0	20143.5	-4.0	13.0	
13	Vandana	280.6	1.0	-2.0	-1.0	23741.1	-4.0	-5.0	
14	**IET 28251**	**384.8**	**22.0**	**1.0**	**23.0**	**4682.9**	**0.0**	**23.0**	**+**
15	**IET 28252**	**456.7**	**30.0**	**2.0**	**32.0**	**150799.7**	**-8.0**	**24.0**	**+**
16	IET 28253	353.1	14.0	-1.0	13.0	46324.5	-8.0	5.0	
17	**IET 28254**	**364.7**	**17.0**	**1.0**	**18.0**	**9714.2**	**0.0**	**18.0**	**+**
18	**Tulasi**	**369.6**	**19.0**	**1.0**	**20.0**	**16159.1**	**0.0**	**20.0**	**+**
19	**IET 28255**	**386.8**	**23.0**	**1.0**	**24.0**	**77190.4**	**-8.0**	**16.0**	**+**
20	**IET 28256**	**411.1**	**27.0**	**1.0**	**28.0**	**22989.1**	**-4.0**	**24.0**	**+**
21	**US 314**	**448.0**	**29.0**	**2.0**	**31.0**	**14590.6**	**0.0**	**31.0**	**+**
22	IET 28257	319.3	6.0	-1.0	5.0	67725.6	-8.0	-3.0	
23	IET 28258	329.2	8.0	-1.0	7.0	14460.5	0.0	7.0	
24	IET 28259	339.5	10.0	-1.0	9.0	12426.7	0.0	9.0	
25	**IET 28260**	**387.6**	**24.0**	**1.0**	**25.0**	**4883.0**	**0.0**	**25.0**	**+**
26	Gangavathi Ageti	303.6	2.0	-2.0	0.0	4248.9	0.0	0.0	
27	IET 28261	349.1	13.0	-1.0	12.0	14068.7	0.0	12.0	
28	Anjali	311.0	4.0	-1.0	3.0	23188.2	-4.0	-1.0	
29	**IET 28262**	**372.0**	**20.0**	**1.0**	**21.0**	**19103.6**	**0.0**	**21.0**	**+**
30	Local	306.7	3.0	-2.0	1.0	6974.4	0.0	1.0	
	Yield Mean:			361.3					
	YS Mean:			13.1					
	LSD (0.05):			51.46					

+ selected genotype, ++ Reference: Kang

Selection for yield and stability: Consequences for growers. Agron. J. 85:754-757.

M. S. 1993. Simultaneous selection for yield

Table 6.2.15 Screening for elite rice culture for drought tolerance on Indices of different rice genotypes grown at different centers Kharif 2019

S.No.	Genotypes	Yp	Ys	DSI	RDI	HTI	GMP	TOL	MP	YI	YSI	DI	SDI	HM	K1STI	K2STI	Ran Sum	Mean Rank	SEm±
1	IET 28240	522.1	369.3	1.02	1.39	0.39	439	153	446	1.03	0.71	0.73	0.29	433	0.55	1.06	195	14	1.1
2	IET 28241	457.6	319.5	1.06	1.37	0.29	382	138	389	0.89	0.70	0.62	0.30	376	0.42	0.79	98	7	0.9
3	IET 28242	551.3	344.6	1.31	1.23	0.38	436	207	448	0.96	0.63	0.60	0.37	424	0.61	0.92	129	9	2.4
4	IET 28243	594.0	424.2	1.00	1.40	0.50	502	170	509	1.18	0.71	0.84	0.29	495	0.71	1.40	278	20	2.2
5	IET 28244	519.6	330.3	1.28	1.25	0.34	414	189	425	0.92	0.64	0.58	0.36	404	0.54	0.85	108	8	1.6
6	IET 28245	482.0	343.9	1.00	1.40	0.33	407	138	413	0.96	0.71	0.68	0.29	401	0.46	0.92	309	22	9.0
7	Sahbhagidhan	563.6	405.8	0.98	1.42	0.46	478	158	485	1.13	0.72	0.81	0.28	472	0.64	1.28	313	22	1.6
8	IET 28246	532.6	381.2	1.00	1.41	0.41	451	151	457	1.06	0.72	0.76	0.28	444	0.57	1.13	271	19	0.8
9	IET 28247	485.9	358.9	0.91	1.45	0.35	418	127	422	1.00	0.74	0.74	0.26	413	0.47	1.00	252	18	1.0
10	IET 28248	437.4	319.3	0.95	1.44	0.28	374	118	378	0.89	0.73	0.65	0.27	369	0.38	0.79	165	12	2.2
11	IET 28249	554.1	405.0	0.94	1.44	0.45	474	149	480	1.13	0.73	0.82	0.27	468	0.61	1.27	311	22	0.8
12	IET 28250	509.1	362.7	1.01	1.40	0.37	430	146	436	1.01	0.71	0.72	0.29	424	0.52	1.02	221	16	0.6
13	Vandana	340.8	280.6	0.62	1.62	0.19	309	60	311	0.78	0.82	0.64	0.18	308	0.23	0.61	171	12	4.0
14	IET 28251	588.3	384.8	1.21	1.29	0.45	476	204	487	1.07	0.65	0.70	0.35	465	0.69	1.15	227	16	2.8
15	IET 28252	628.3	456.7	0.96	1.43	0.57	536	172	542	1.27	0.73	0.92	0.27	529	0.79	1.62	334	24	2.1
16	IET 28253	455.3	353.1	0.79	1.52	0.32	401	102	404	0.98	0.78	0.76	0.22	398	0.41	0.97	239	17	2.4
17	IET 28254	450.4	364.7	0.67	1.59	0.33	405	86	408	1.02	0.81	0.82	0.19	403	0.41	1.03	255	18	2.4
18	Tulasi	486.1	369.6	0.84	1.50	0.36	424	116	428	1.03	0.76	0.78	0.24	420	0.47	1.06	268	19	1.3
19	IET 28255	589.7	386.8	1.20	1.29	0.46	478	203	488	1.08	0.66	0.71	0.34	467	0.70	1.16	230	16	2.8
20	IET 28256	555.3	411.1	0.91	1.46	0.46	478	144	483	1.15	0.74	0.85	0.26	472	0.62	1.31	317	23	0.8
21	US 314	635.3	448.0	1.03	1.39	0.57	533	187	542	1.25	0.71	0.88	0.29	525	0.81	1.56	282	20	3.1
22	IET 28257	485.9	319.3	1.20	1.29	0.31	394	167	403	0.89	0.66	0.58	0.34	385	0.47	0.79	109	8	0.8
23	IET 28258	434.4	329.2	0.85	1.49	0.29	378	105	382	0.92	0.76	0.70	0.24	375	0.38	0.84	169	12	2.7
24	IET 28259	445.2	339.5	0.83	1.50	0.30	389	106	392	0.95	0.76	0.72	0.24	385	0.40	0.89	194	14	2.5
25	IET 28260	547.9	387.6	1.02	1.39	0.42	461	160	468	1.08	0.71	0.76	0.29	454	0.60	1.17	234	17	1.6
26	Gangavathi Ageti	408.3	303.6	0.90	1.46	0.25	352	105	356	0.85	0.74	0.63	0.26	348	0.33	0.72	130	9	3.1
27	IET 28261	481.6	349.1	0.96	1.43	0.34	410	133	415	0.97	0.72	0.70	0.28	405	0.46	0.95	185	13	0.8
28	Anjali	429.3	311.0	0.96	1.42	0.27	365	118	370	0.87	0.72	0.63	0.28	361	0.37	0.75	108	8	2.1
29	IET 28262	526.4	372.0	1.03	1.39	0.39	443	154	449	1.04	0.71	0.73	0.29	436	0.55	1.07	200	14	1.4
30	Local	474.1	306.7	1.24	1.27	0.29	381	167	390	0.85	0.65	0.55	0.35	372	0.45	0.73	60	4	0.7
	Mean	**505.7**	**361.3**	**1.0**	**1.4**	**0.4**	**427.2**	**144.5**	**433.5**	**1.0**	**0.7**	**0.7**	**0.3**	**421.1**	**0.5**	**1.0**	**212.1**	**15.1**	**2.1**

Yp = Yield under irrigated condition, Ys = Yield under rainfed condition, DSI= Drought susceptibility index, DTI= Drought Tolerance Index
TOL: Tolerance, MP = Mean Productivity, GMP = Geometric Mean of Productivity, HM = Hormonic Mean, YSI = Yield Stability Index
YI= Yield Index, SDI = susceptibility drought index, K1STI = Revised Stress Tolerance Index, K2STI = Revised Stress Tolerance Index

Table 6.2.2.1 Screening for elite rice culture for drought tolerance during Rabi 2018-19 at Titabar

S.No.	Genotypes	No. of tillers/plant		Mean	Stem Weight (g/plant)		Mean	Shoot Weight (g/m2)		Mean
		Drought	Irrigated		Drought	Irrigated		Drought	Irrigated	
1	IET 27508	16	21	19	12.3	15.0	13.6	389	559	474
2	IET 27509	17	17	17	10.7	12.7	11.7	385	500	443
3	IET 27510	15	23	19	11.5	12.6	12.1	350	690	520
4	IET 27511	20	20	20	13.6	13.9	13.7	500	611	555
5	IET 27512	15	18	17	10.9	12.0	11.5	347	552	449
6	IET 27513	15	18	16	9.6	10.9	10.2	361	665	513
7	IET 27514	9	21	15	8.0	8.8	8.4	278	570	424
8	IET 27515	10	14	12	7.7	9.7	8.7	336	602	469
9	IET 27516	16	23	20	13.8	14.8	14.3	386	606	496
10	IET 27517	15	23	19	12.7	14.7	13.7	356	714	535
11	Sahabhagidhan	18	18	18	13.3	14.9	14.1	437	611	524
12	IET 27518	18	17	18	9.2	12.8	11.0	385	685	535
13	IET 27519	12	18	15	10.5	12.6	11.5	333	580	456
14	IET 27520	9	14	12	9.8	11.3	10.6	273	556	414
15	IET 27521	10	18	14	13.5	14.9	14.2	288	606	447
16	IET 27522	13	11	12	9.8	11.0	10.4	411	611	511
17	IET 27523	14	19	16	7.4	8.3	7.9	299	523	411
18	IET 27524	11	17	14	13.5	16.6	15.0	275	688	481
19	IET 27525	21	18	19	11.5	20.4	16.0	450	520	485
20	Vandana	12	14	13	12.0	15.2	13.6	389	565	477
21	IET 27526	11	11	11	13.1	13.5	13.3	288	625	457
22	IET 27527	15	16	16	11.6	11.3	11.5	369	556	462
23	IET 27528	12	14	13	19.5	30.6	25.1	314	575	444
24	IET 27529	13	21	17	11.5	13.3	12.4	288	479	383
25	IET 27530	20	16	18	9.8	12.3	11.0	294	553	423
26	Tulasi	14	19	17	9.9	15.0	12.5	283	494	389
27	NDR-97	19	17	18	12.0	17.7	14.9	306	516	411
28	Govind	17	16	17	12.9	14.9	13.9	412	631	521
29	Samaleshwari	17	19	18	10.4	12.2	11.3	365	592	478
30	Varalu	13	22	18	6.7	8.4	7.6	311	539	425
	Mean	**15**	**18**	**16**	**11.3**	**13.8**	**12.5**	**348**	**586**	**467**
	LSD (Treat)		0.59**			0.644**			18.8**	
	LSD (Genotype)		2.29**			2.49**			72.78**	
	LSD (Treat x Genotype)		3.25**			3.5**			102.9**	
	C.V (%)		9.4			13.18			10.3	

Table 6.2.2 Screening for elite rice culture for drought tolerance during Rabi 2018-19 at Titabar

S.No.	Genotypes	Panicle wt g/m2		Mean	Panicle No/m2		Mean	grain no/pan		Mean
		Drought	Irrigated		Drought	Irrigated		Drought	Irrigated	
1	IET 27508	191	528	360	241	287	264	88	151	119
2	IET 27509	167	357	262	250	307	278	75	95	85
3	IET 27510	129	475	302	281	294	287	64	130	97
4	IET 27511	295	411	353	235	303	269	89	116	102
5	IET 27512	125	417	271	243	274	259	70	100	85
6	IET 27513	135	369	252	254	291	272	80	109	94
7	IET 27514	170	476	323	238	284	261	86	116	101
8	IET 27515	301	554	428	198	255	227	93	107	100
9	IET 27516	186	436	311	246	289	268	83	124	104
10	IET 27517	162	535	348	268	288	278	76	113	95
11	Sahabhagidhan	284	426	355	154	231	193	95	114	105
12	IET 27518	118	515	317	186	210	198	64	132	98
13	IET 27519	312	311	312	189	241	215	100	115	107
14	IET 27520	230	467	349	191	201	196	82	137	109
15	IET 27521	274	496	385	222	244	233	84	113	98
16	IET 27522	304	489	397	260	289	274	93	115	104
17	IET 27523	349	453	401	248	276	262	77	112	94
18	IET 27524	168	534	351	192	288	240	64	172	118
19	IET 27525	323	438	381	270	294	282	100	122	111
20	Vandana	322	383	353	228	308	268	96	117	106
21	IET 27526	199	379	289	217	261	239	71	113	92
22	IET 27527	327	425	376	256	322	289	81	89	85
23	IET 27528	289	498	393	236	298	267	89	135	112
24	IET 27529	250	363	307	226	286	256	73	109	91
25	IET 27530	112	381	247	235	279	257	61	122	91
26	Tulasi	114	422	268	204	224	214	70	98	84
27	NDR-97	156	308	232	268	282	275	66	85	75
28	Govind	291	406	348	228	243	235	96	114	105
29	Samaleshwari	207	414	311	253	281	267	72	120	96
30	Varalu	181	324	253	205	253	229	67	104	85
	Mean	**222**	**433**	**328**	**231**	**273**	**252**	**80**	**116**	**98**
	LSD (Treat)		4.4**			12.1**			3.4**	
	LSD (Genotype)		17.1**			47.5**			13.4**	
	LSD (Treat x Genotype)		3.4**			NS			18.9**	
	C.V (%)		3.44			12.5			9.07	

Table 6.2.3 Screening for elite rice culture for drought tolerance during Rabi 2018-19 at Titabar

S.No.	Genotypes	spikelet no/pan		Mean	No. of grains/m2		Mean	No.of Spikelets/m2		Mean
		Drought	Irrigated		Drought	Irrigated		Drought	Irrigated	
1	IET 27508	107	181	144	21119	43080	32100	25765	51696	38731
2	IET 27509	92	115	103	18835	29153	23994	22979	35224	29101
3	IET 27510	78	157	117	17939	38206	28072	21885	46048	33966
4	IET 27511	108	140	124	20827	35119	27973	25408	42441	33925
5	IET 27512	85	121	103	16927	27415	22171	20651	33124	26887
6	IET 27513	98	129	114	20331	31577	25954	24804	37658	31231
7	IET 27514	105	140	123	20462	32816	26639	24963	39817	32390
8	IET 27515	113	129	121	18465	27213	22839	22527	32833	27680
9	IET 27516	101	148	125	20442	35896	28169	24939	42925	33932
10	IET 27517	93	136	114	20399	32616	26507	24886	39233	32060
11	Sahabhagidhan	116	136	126	14542	26370	20456	17742	31400	24571
12	IET 27518	77	157	117	11887	27706	19797	14503	33112	23807
13	IET 27519	121	138	130	18777	27627	23202	22907	33358	28133
14	IET 27520	100	163	131	15725	27419	21572	19185	32689	25937
15	IET 27521	102	136	119	18397	27522	22960	22445	33146	27795
16	IET 27522	113	139	126	24038	33286	28662	29326	40230	34778
17	IET 27523	94	135	115	19115	30737	24926	23320	37308	30314
18	IET 27524	77	207	142	12076	49438	30757	14733	59603	37168
19	IET 27525	121	145	133	26834	35823	31328	32737	42712	37724
20	Vandana	117	139	128	21731	35820	28775	26511	42620	34566
21	IET 27526	86	136	111	15324	29471	22397	18695	35597	27146
22	IET 27527	99	106	103	20752	28491	24622	25317	34210	29763
23	IET 27528	109	161	135	21109	40121	30615	25753	47936	36845
24	IET 27529	88	131	110	16448	30972	23710	20067	37459	28763
25	IET 27530	74	145	110	14360	34037	24198	17519	40752	29135
26	Tulasi	85	118	101	13971	22170	18071	17045	26604	21824
27	NDR-97	81	101	91	17696	23867	20781	21589	28640	25115
28	Govind	117	137	127	21811	27714	24762	26609	33256	29933
29	Samaleshwari	87	143	115	18026	33527	25776	21991	40232	31112
30	Varalu	81	124	103	13845	26233	20039	16890	31480	24185
	Mean	**97**	**140**	**119**	**18407**	**31715**	**25061**	**22456**	**38111**	**30284**
	LSD (Treat)		4.1**			1564**			1874**	
	LSD (Genotype)		15.9**			6059**			7261**	
	LSD (Treat x Genotype)		22.6**			8568**			10269**	
	C.V (%)		8.9			15.9			15.9	

Table 6.2.2.4 Screening for elite rice culture for drought tolerance during Rabi 2018-19 at Titabar

S.No.	Genotypes	Grain Yield (g/m2)		Mean	1000 grain weight (g)		Mean	Harvest Index (%)		Mean
		Drought	Irrigated		Drought	Irrigated		Drought	Irrigated	
1	IET 27508	151	459	305	18.0	21.7	19.8	26.0	42.0	34.0
2	IET 27509	131	310	221	15.7	17.3	16.5	24.3	36.3	30.3
3	IET 27510	101	414	257	15.7	20.0	17.8	20.7	36.0	28.3
4	IET 27511	232	357	295	23.3	25.0	24.2	29.0	35.0	32.0
5	IET 27512	94	361	227	18.3	22.0	20.2	20.0	37.3	28.7
6	IET 27513	106	320	213	16.7	21.7	19.2	21.0	31.0	26.0
7	IET 27514	132	414	273	22.3	25.3	23.8	29.7	40.0	34.8
8	IET 27515	237	484	360	22.7	24.0	23.3	37.0	42.0	39.5
9	IET 27516	145	383	264	17.7	21.3	19.5	25.3	37.0	31.2
10	IET 27517	125	468	296	17.3	22.0	19.7	24.0	37.3	30.7
11	Sahabhagidhan	225	372	298	22.3	24.0	23.2	31.0	36.0	33.5
12	IET 27518	90	451	270	18.7	23.0	20.8	18.3	37.3	27.8
13	IET 27519	245	268	256	23.3	25.0	24.2	37.7	30.0	33.8
14	IET 27520	178	410	294	19.0	21.7	20.3	35.3	40.3	37.8
15	IET 27521	216	430	323	19.7	22.7	21.2	38.0	39.0	38.5
16	IET 27522	242	427	335	23.7	24.3	24.0	33.7	39.0	36.3
17	IET 27523	278	394	336	20.3	22.0	21.2	40.0	40.3	40.2
18	IET 27524	134	464	299	17.7	22.3	20.0	30.0	38.0	34.0
19	IET 27525	256	377	316	23.7	24.3	24.0	33.3	39.3	36.3
20	Vandana	255	331	293	22.0	22.3	22.2	36.0	35.0	35.5
21	IET 27526	158	334	246	18.3	23.7	21.0	32.3	33.3	32.8
22	IET 27527	260	368	314	20.3	23.0	21.7	37.0	37.7	37.3
23	IET 27528	230	435	332	17.3	20.0	18.7	38.0	40.3	39.2
24	IET 27529	199	315	257	16.7	20.0	18.3	37.0	37.3	37.2
25	IET 27530	89	333	211	18.7	25.0	21.8	21.7	36.0	28.8
26	Tulasi	91	367	229	17.3	23.3	20.3	23.0	40.3	31.7
27	NDR-97	124	268	196	20.3	24.0	22.2	26.7	33.0	29.8
28	Govind	231	353	292	19.3	20.0	19.7	33.0	34.3	33.7
29	Samaleshwari	165	360	262	16.3	19.0	17.7	29.0	36.0	32.5
30	Varalu	144	282	213	16.7	21.0	18.8	29.3	32.7	31.0
	Mean	**175**	**377**	**276**	**19.3**	**22.4**	**20.8**	**29.9**	**37.0**	**33.4**
	LSD (Treat)		3.73**			0.309**			0.833**	
	LSD (Genotype)		14.50**			1.20**			3.23**	
	LSD (Treat x Genotype)		20.46**			1.695**			4.57**	
	C.V (%)		3.49			3.86			6.4	

Table 6.2.2.5 Screening for elite rice culture for drought tolerance during Rabi 2018-19 at Titabar

	Yp	Ys	DSI	RDI	DTI	GMP	TOL	MP	YI	YSI	DI	SDI	HM	K1STI	K2STI
Yp	1.00	0.02	0.39	-0.39	0.41	0.41	0.69	0.71	0.02	-0.39	-0.21	0.39	0.22	1.00	0.02
Ys	0.02	1.00	-0.90	0.90	0.91	0.91	-0.71	0.72	1.00	0.90	0.95	-0.90	0.97	0.01	0.99
DSI	0.39	-0.90	1.00	-1.00	-0.64	-0.65	0.93	-0.36	-0.90	-1.00	-0.97	1.00	-0.78	0.39	-0.89
RDI	-0.39	0.90	-1.00	1.00	0.64	0.65	-0.93	0.36	0.90	1.00	0.97	-1.00	0.78	-0.39	0.89
DTI	0.41	0.91	-0.64	0.64	1.00	1.00	-0.37	0.93	0.91	0.64	0.76	-0.64	0.98	0.40	0.90
GMP	0.41	0.91	-0.65	0.65	1.00	1.00	-0.37	0.93	0.91	0.65	0.76	-0.65	0.98	0.40	0.90
TOL	0.69	-0.71	0.93	-0.93	-0.37	-0.37	1.00	-0.03	-0.71	-0.93	-0.84	0.93	-0.55	0.69	-0.71
MP	0.71	0.72	-0.36	0.36	0.93	0.93	-0.03	1.00	0.72	0.36	0.53	-0.36	0.84	0.70	0.72
YI	0.02	1.00	-0.90	0.90	0.91	0.91	-0.71	0.72	1.00	0.90	0.95	-0.90	0.97	0.01	0.99
YSI	-0.39	0.90	-1.00	1.00	0.64	0.65	-0.93	0.36	0.90	1.00	0.97	-1.00	0.78	-0.39	0.89
DI	-0.21	0.95	-0.97	0.97	0.76	0.76	-0.84	0.53	0.95	0.97	1.00	-0.97	0.86	-0.22	0.96
SDI	0.39	-0.90	1.00	-1.00	-0.64	-0.65	0.93	-0.36	-0.90	-1.00	-0.97	1.00	-0.78	0.39	-0.89
HM	0.22	0.97	-0.78	0.78	0.98	0.98	-0.55	0.84	0.97	0.78	0.86	-0.78	1.00	0.21	0.95
K1STI	1.00	0.01	0.39	-0.39	0.40	0.40	0.69	0.70	0.01	-0.39	-0.22	0.39	0.21	1.00	0.01
K2STI	0.02	0.99	-0.89	0.89	0.90	0.90	-0.71	0.72	0.99	0.89	0.96	-0.89	0.95	0.01	1.00

Table 6.2.2.6 Drought tolerance indices of different rice genotypes during Rabi 2018-19 season at TTB

Genotype	Yp	Ys	DSI	RDI	DTI	GMP	TOL	MP	YI	YSI	DI	SDI	HM	K1STI	K2STI
IET 27508	459	151	2.28	0.65	0.14	263	308	305	0.42	0.33	0.14	0.67	227	0.42	0.18
IET 27509	310	131	1.96	0.83	0.08	202	179	221	0.36	0.42	0.15	0.58	184	0.19	0.13
IET 27510	414	101	2.57	0.48	0.08	204	314	257	0.28	0.24	0.07	0.76	162	0.34	0.08
IET 27511	357	232	1.19	1.28	0.17	288	125	295	0.65	0.65	0.42	0.35	281	0.25	0.42
IET 27512	361	94	2.51	0.51	0.07	184	268	227	0.26	0.26	0.07	0.74	149	0.26	0.07
IET 27513	320	106	2.27	0.65	0.07	184	215	213	0.29	0.33	0.10	0.67	159	0.20	0.09
IET 27514	414	132	2.31	0.63	0.11	234	282	273	0.37	0.32	0.12	0.68	200	0.34	0.14
IET 27515	484	237	1.73	0.96	0.23	338	248	360	0.66	0.49	0.32	0.51	318	0.47	0.43
IET 27516	383	145	2.11	0.74	0.11	236	238	264	0.40	0.38	0.15	0.62	210	0.29	0.16
IET 27517	468	125	2.49	0.53	0.12	242	343	296	0.35	0.27	0.09	0.73	197	0.44	0.12
Sahabhagidhan	372	225	1.34	1.19	0.17	289	147	298	0.63	0.60	0.38	0.40	280	0.28	0.39
IET 27518	451	90	2.71	0.39	0.08	201	361	270	0.25	0.20	0.05	0.80	150	0.41	0.06
IET 27519	268	245	0.29	1.80	0.13	256	23	256	0.68	0.91	0.62	0.09	255	0.14	0.46
IET 27520	410	178	1.92	0.85	0.15	270	232	294	0.50	0.43	0.22	0.57	248	0.34	0.25
IET 27521	430	216	1.69	0.99	0.19	304	215	323	0.60	0.50	0.30	0.50	287	0.37	0.36
IET 27522	427	242	1.47	1.12	0.21	322	185	335	0.68	0.57	0.38	0.43	309	0.36	0.46
IET 27523	394	278	1.00	1.39	0.22	330	116	336	0.77	0.71	0.55	0.29	325	0.31	0.60
IET 27524	464	134	2.42	0.57	0.12	249	330	299	0.37	0.29	0.11	0.71	207	0.43	0.14
IET 27525	377	256	1.09	1.34	0.19	310	121	316	0.71	0.68	0.48	0.32	305	0.28	0.51
Vandana	331	255	0.78	1.52	0.17	291	76	293	0.71	0.77	0.55	0.23	288	0.22	0.51
IET 27526	334	158	1.79	0.93	0.11	230	176	246	0.44	0.47	0.21	0.53	215	0.22	0.19
IET 27527	368	260	1.00	1.39	0.19	309	109	314	0.72	0.71	0.51	0.29	304	0.27	0.52
IET 27528	435	230	1.60	1.04	0.20	316	206	332	0.64	0.53	0.34	0.47	300	0.38	0.41
IET 27529	315	199	1.25	1.24	0.13	250	117	257	0.55	0.63	0.35	0.37	244	0.20	0.31
IET 27530	333	89	2.48	0.53	0.06	172	244	211	0.25	0.27	0.07	0.73	140	0.22	0.06
Tulasi	367	91	2.56	0.48	0.07	182	277	229	0.25	0.25	0.06	0.75	145	0.27	0.06
NDR-97	268	124	1.83	0.91	0.07	182	145	196	0.34	0.46	0.16	0.54	169	0.14	0.12
Govind	353	231	1.18	1.28	0.16	285	122	292	0.64	0.65	0.42	0.35	279	0.25	0.41
Samaleshwari	360	165	1.84	0.90	0.12	243	196	262	0.46	0.46	0.21	0.54	226	0.26	0.21
Varalu	282	144	1.66	1.00	0.08	202	138	213	0.40	0.51	0.20	0.49	191	0.16	0.16
Mean	**377**	**175**	**1.78**	**0.94**	**0.13**	**252**	**202**	**276**	**0.49**	**0.48**	**0.26**	**0.52**	**232**	**0.29**	**0.27**

6.3 Screening for high temperature tolerance in rice genotypes.

Locations: IIRR, MTU, PNR, PTB, MTU, CHN ,TTB and NRRI

The General Circulation Models (GCMs) of earth's atmosphere predicted that, when rapidly increasing CO_2 concentration ([CO_2]) in the atmosphere would double the concentration of the beginning of the last century, then the global mean temperature would increase as much as more than 4 °C. At present rice is mainly grown in areas where the current temperatures are more or less optimum for rice cultivation. An increase in temperatures due to climate change resulting in increased mean temperatures or short episodes of high temperature during critical growth stages will reduce grain yield. It was estimated that rice grain yield may be reduced by 41% by the end of 21st century. Thus, identifying and developing high temperature tolerant cultivars is essential to develop new tolerant varieties to meet the demand for food in future climates. The objectives of this work is to screen rice cultivars for high temperature tolerance and to understand the impact of high temperature stress on rice. The trial was conducted in 8 AICRIP centres with 27 entries from IVT-IME trial along with N-22(Tolerant Check), Vandana (Susceptible check) and Gontra Bidhan-3. Heat stress was imposed by enclosing the field grown crop with transparent polyethylene sheet supported by metal or bamboo frame. Enclosing the field crop during reproductive phase with polythene sheet had resulted in significant increase in temperature. The temperature inside the polythene tunnel was recorded until the crop was harvested.

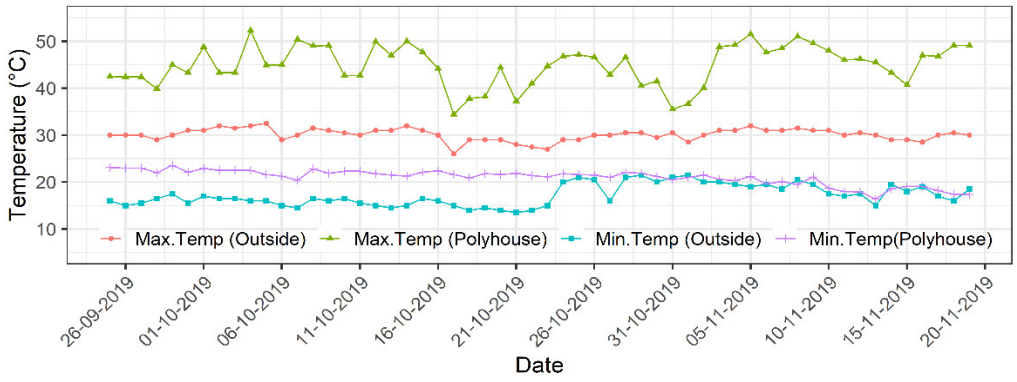


Fig. 6.3.1 Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside (ambient) the polythene tunnel at IIRR Hyderabad during Kharif-2019.

The mean maximum temperature recorded during reproductive stage is > 12°C higher inside the polythene tunnel than ambient temperature recorded during the same period. Similarly, the mean minimum temperature was >2.5°C higher inside the polythene tunnel than ambient temperature at IIRR. The mean maximum temperature recorded during reproductive stage is

> 9.5°C higher inside the polythene tunnel than ambient temperature recorded during the same period. Similarly, the mean minimum temperature was >1.4°C higher inside the polythene tunnel than ambient temperature at PNR *(Fig.6.3.2).* At PTB centre, mean maximum temperature recorded during reproductive period is >9°C higher inside polythene tunnel than ambient temperature recorded. Similarly, the mean minimum temperature is >1.6 higher inside the polythene tunnel (*Fig.6.3.3).* At MTU centre mean maximum temperature recorded during reproductive phase of the crop is >4.1°C higher and mean minimum temperature is >2.0°C higher inside the polythene tunnel than the temperature recorded outside *(Fig.6.3.4).* The temperature recorded during reproductive stage of the crop inside and outside the polythene tunnel show that the mean maximum temperature is >3.4°C higher and mean minimum temperature is <1.0°C higher inside the polythene tunnel in comparison with outside the polythene tunnel at TTB (*Fig.6.3.5)*

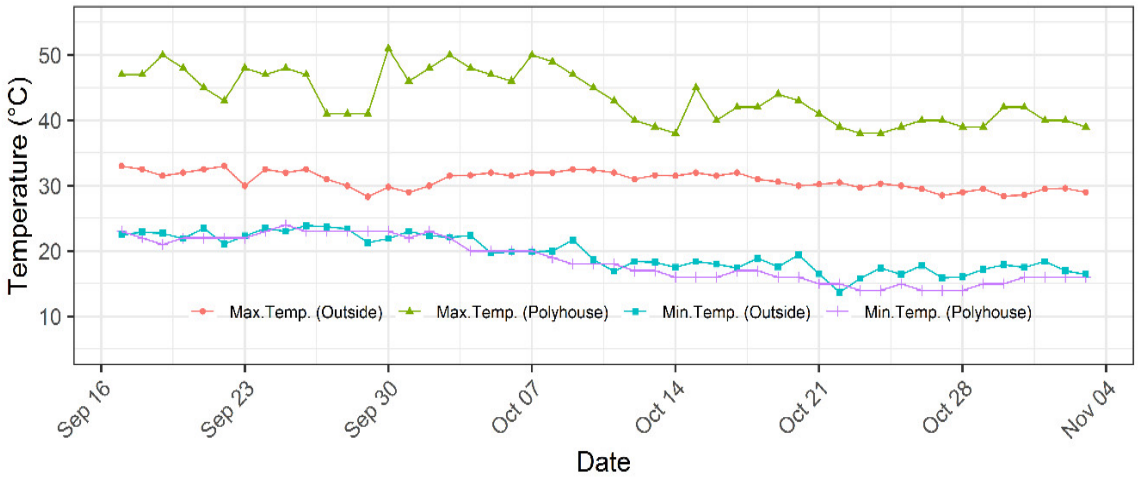


Fig. 6.3.2 Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside (ambient) the polythene tunnel at PNR (G.B.P.A &T) during Kharif-2019.

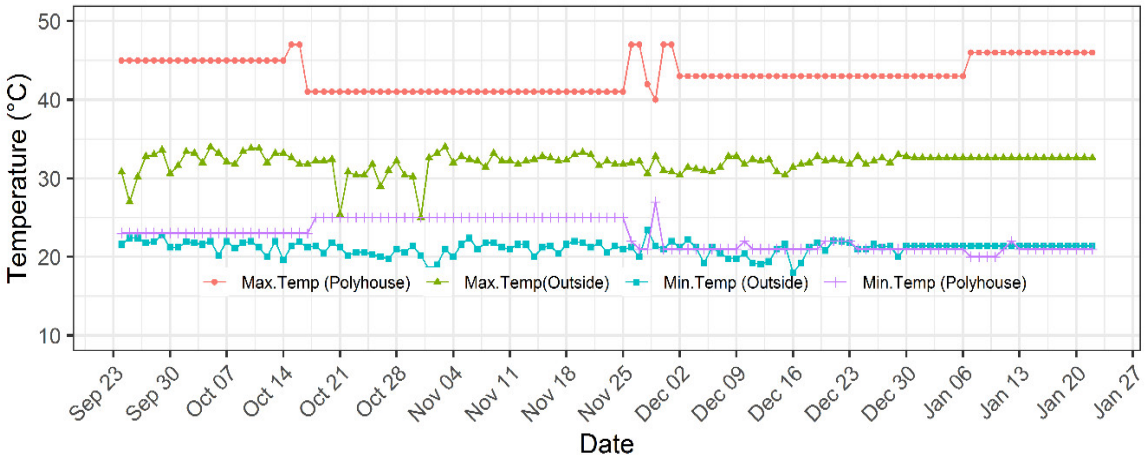


Fig. 6.3.3. Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside (ambient) the polythene tunnel at PTB centre during Kharif-2019.

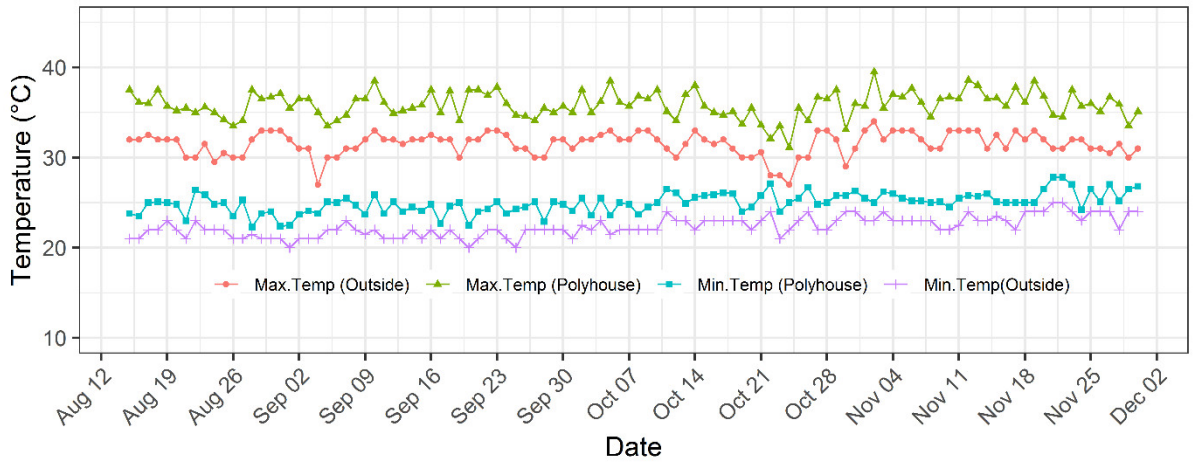


Fig. 6.3.4 Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside (ambient) the polythene tunnel at MTU centre during Kharif-2019.

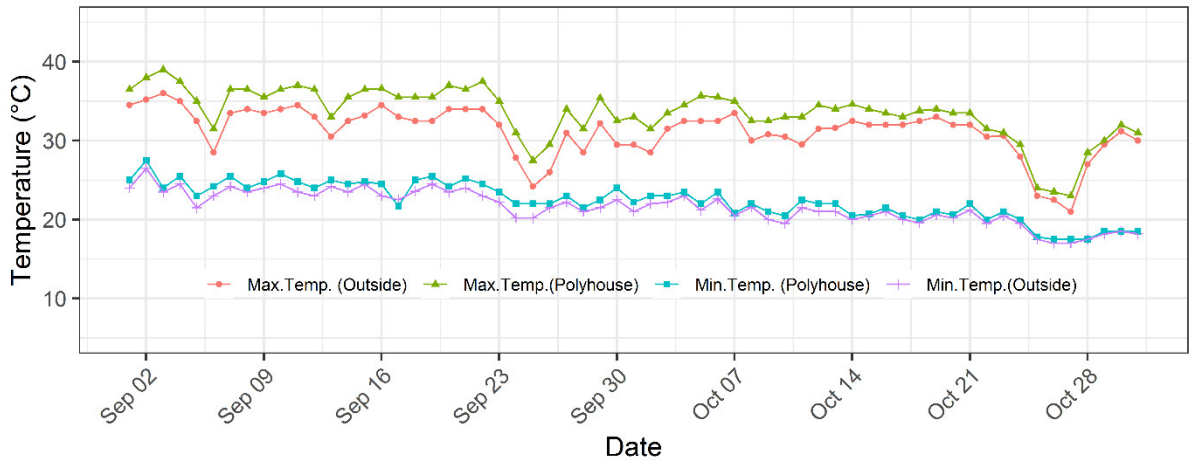


Fig. 6.3.5 Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside (ambient) the polythene tunnel at TTB centre during Kharif-2019.

The crop was allowed to grow inside the enclosure from PI stage until harvest. The experiment was conducted in 2 factor RCBD design with treatments (Control and Heat stressed) as first factor and genotypes as 2nd factor treatment with 3 replications.

Exposure to elevated temperature during reproductive stage did not affected the mean days to flowering (mean of all entries and locations). However, the interaction between location and treatment was found to be significant ($p<0.01$). The differences between the genotypes was found to be significant ($p<0.01$). The interaction between genotype x location was also significant implying that the genotypes behaved differently at different locations. However, the interaction between Genotype x Treatment was found to be non-significant indicating that the genotypes did not behaved differently under different temperature regimes

(Table 6.3.1). The three-way interaction between Treatment x Genotype x Location was also found to be non-significant.

The mean days for physiological maturity (mean of all genotypes and locations) was not significantly influenced by temperature regime. However, the interaction between Treatment x Location was found to be significant *($p<0.01$)* indicating that the influence of elevated temperature differs from location to location. It is pertinent to mention that the increase in temperature inside the polythene tunnel is not uniform across the locations. The differences in the mean days to maturity (mean of all locations & treatment) were found to be significant *($p<0.01$).* Non-significant interaction between Treatment x Genotype interaction indicated that the genotypes did not differed significantly under different temperature regimes (*Table 6.3.2).*

The mean Plant height (PH) was not significantly affected by elevated temperature *(Table 6.3.3).* However, the mean (mean of all locations and genotypes) PH was increased by <4% by high temperature treatment. However, the interaction between Treatment x Location was found to be significant *($p<0.01$).* High temperature exposure increased PH at PTB, IIRR and TTB where as PH was affected at the remaining centres (*Table 6.3.3).* The mean PH (mean of all locations and Treatments) for the genotypes was significantly influenced by high temperature. The mean PH recorded marginal increase for most of the tested entries.

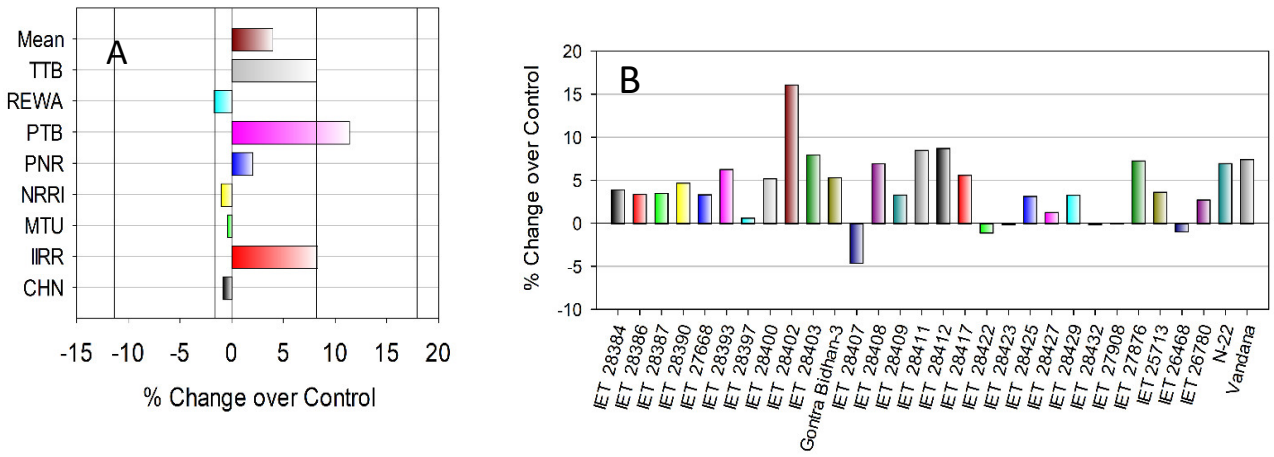


Fig. 6.3.6 Influence of high temperature on mean plant height (cm) recorded at maturity stage (A) Mean of all Genotypes (B) Mean of all locations. Each bar represents % change under high temperature treatment in Plant height in relation to ambient control treatment.(A) Mean of all genotypes (B) Mean of all locations.

However, the % change in PH was <5% in many genotypes *(Fig.6.3.6*). The increase in >15% over control in IET8402. The interaction between Location x Genotype was found to be significant implying that the genotypes differed differently at different AICRIP locations (Fig. *6.3.6A).* The interaction Treatment x Genotype was non-significant. Similarly the three-way interaction between Treatment x Genotype x Location was also non-significant.

Leaf Area Index (LAI) was measured at flowering stage. The mean LAI (mean of all locations and genotypes) was not significantly affected by high temperature (AC42088 show maximum survival percentage (98%) followed by Sabita (61%) Swarna Sub-1 (61%) andIC516009 (<58%). As many as 7 genotypes did not survived the submergence treatment However, the interaction between Treatment x Location was significant *(p<0.01*) indicating that the treatment effect was not uniform across the locations. This is due to the fact that the increase in temperature in the polythene tunnel (heat treatment) is not uniform across locations. The differences between the mean LAI amongst the tested entries was also non-significant. Nevertheless, the interaction between Location x Genotype was found to be significant *(p<0.01)* indicating that the tested entries recorded differences across the locations. All the remaining interactions were non-significant (*Table 6.3.4).*

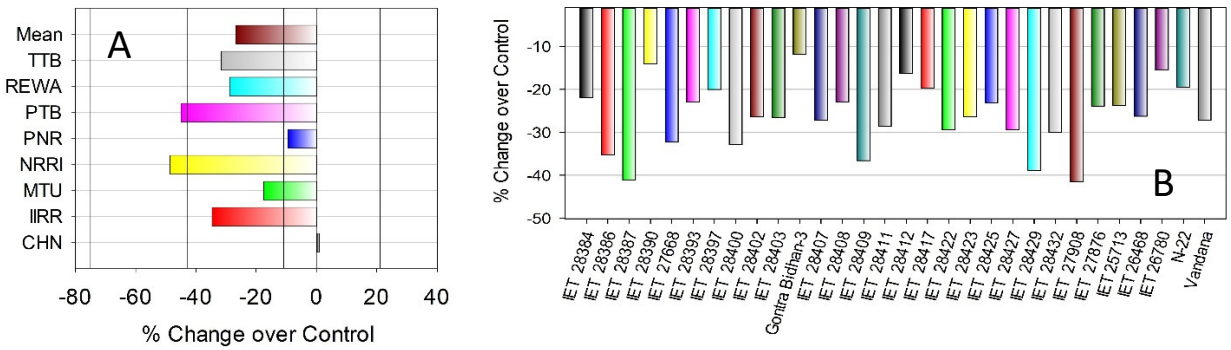


Fig.6.3.7 : Influence of high temperature on number of grains per panicle in different rice genotypes during Kharif-2019 season. Each bar represents % change in No.of grains under high temperature in comparison with ambient control temperature. (A) Mean of all genotypes (B) Mean of all Locations

Total number of grains per panicle is one of the most important trait which was affected by the high temperature conditions during reproductive growth of rice crop resulting in significant yield loss. In the present study, the mean grain number was reduced by >26% under high temperature condition (*Table 6.3.12 & Fig,6.3.7A).* Significant differences were observed between the locations. Maximum reduction was observed at NRRI followed by PTB and at PNR and CHN centres the reduction is negligible. Similarly, significant

differences were observed amongst the genotypes in their response to exposure to high temperature. Maximum reduction was observed in IET 28387 followed by IET 27908. The entries IET28429, IET28400 and IET28407 recorded more reduction in grain number than the susceptible check Vandana (Fig.9B). The entries Gontra Bidhan-3, IET 28390 and IET26780 performed better than the tolerant check N22 in terms of reduction in number of grains per panicle (*Table 6.3.12*).

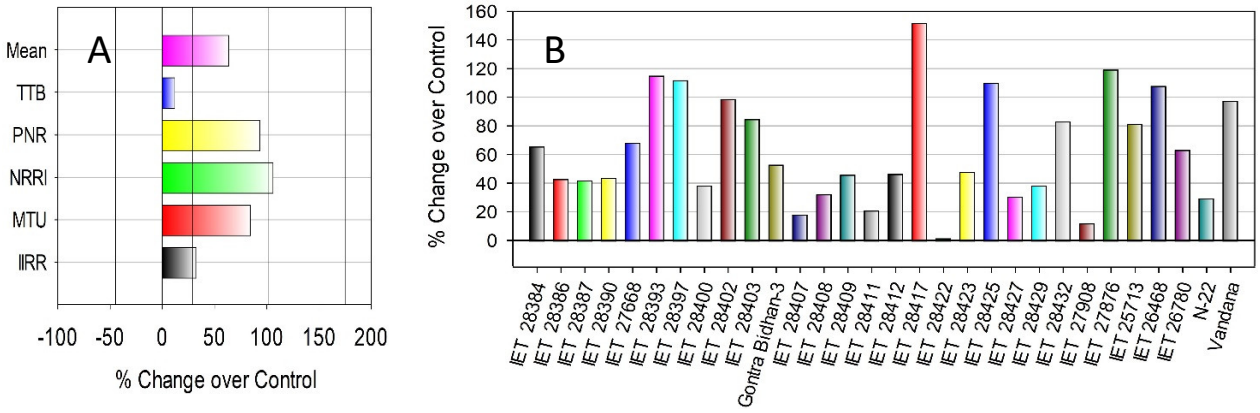


Fig.6.3.8: Influence of high temperature on number of unfilled grains per panicle in different rice genotypes during Kharif-2019 season. Each bar represents % change in No.of un-filled grains under high temperature in comparison with ambient control temperature. (A) Mean of all genotypes (B) Mean of all locations

Exposure to the high temperature during reproductive stage, especially grain filling stage significantly influenced the number of un-filled grains per panicle. The mean (average of all locations and genotypes) number of un-filled grains increased by 63% under high temperature stress in comparison with ambient control conditions (*Fig 6.3.8).* In entries IET28407, IET28422, 28411 and IET27908 the increase in un-filled grains per panicle is less than the tolerant check variety N-22. Similarly, IET28417 and IET 28393 recorded more number of un-filled grains per panicle than the susceptible check Vandana *(Fig.6.3.8).* Similarly, significant differences were observed between locations. Maximum increase in number of un-filled grains was observed at NRRI, Cuttack followed by PNR and MTU. Minimum increase was observed in case of TTB.

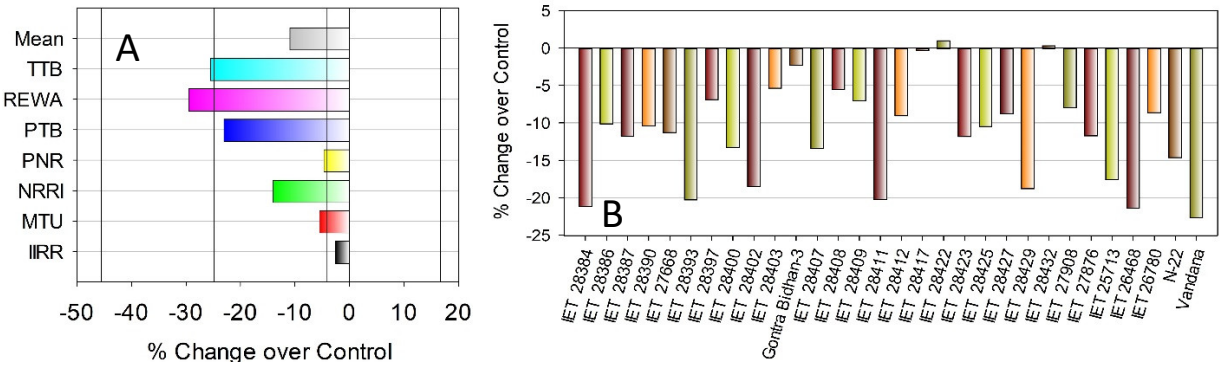


Fig.6.3.9: Influence of high temperature on number of Number of panicle/m^2 in different rice genotypes during Kharif-2019 season. Each bar represents % change in No.of of panicle/m^2 under high temperature in comparison with ambient control temperature. (A) Mean of all genotypes (B) Mean of all locations

The mean number of of panicle/m^2 was another important yield attribute which show marginal non-significant reduction (>10% in comparison with control) under high temperature stress. The interaction between Treatment x Location was found to be significant implying that the effect of elevated tempeature is not uniform across the locations. Maximum reduction in the mean number of of panicle/m^2 was observed at REWA followed by TTB and PTB. The reduction was very low in case of PNR, IIRR and MTU. Significant ($p<0.01$) differences were observed between the tested entries. Maximum reduction was observed in Vandana, IET 28384 and IET 26468. The reduction was significantly lower in Gotra Bidhan-3, IET28432, IET28417 and IET28422. Many entries recorded less reduction in number of panicles per sq.m than the tolerant check N-22 (*Fig.6.3.9).*

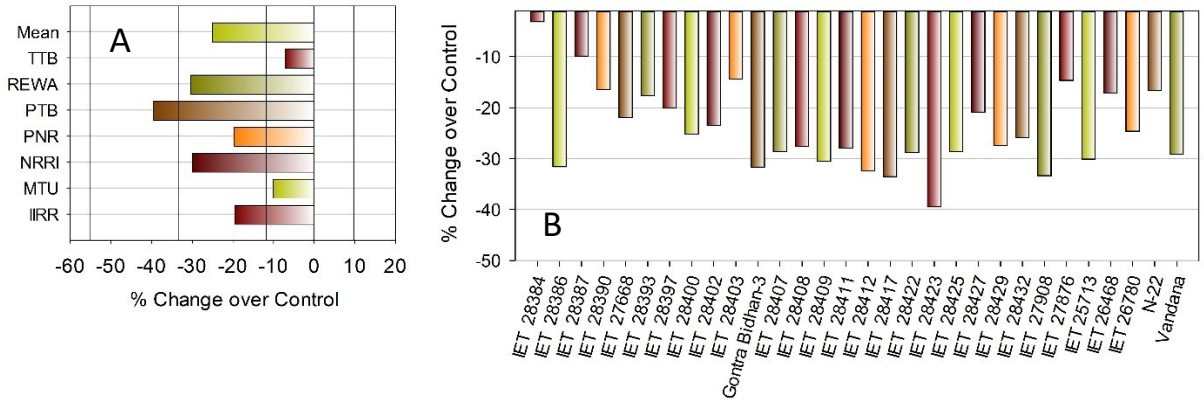


Fig 6.3.10: Influence of high temperature on TDM in different rice genotypes during Kharif-2019 season. Each bar represents % change in TDM under high temperature in comparison with ambient control temperature. (A) Mean of all genotypes (B) Mean of all locations

The above ground biomass (TDM g/m^2) was recorded after harvest. The mean TDM was reduced by >24% under high temperature in comparison with ambient temperature

(Table 6.3.16). The interaction between Treatment x Location was significant indicating that the effect of treatment differed from location to location. Maximum reduction in mean (average of all genotypes) was observed at PTB followed by REWA and NRRI. The reduction in TDM was lower than the mean of all locations in MTU and TTB. Significant ($p<0.01$) differences were observed amongst the tested entries. The reduction in TDM is lower in IET28384 and IET28387 which is lower than the tolerant check N-22. The entries IET28423 and IET28908 showed higher reduction in TDM than the susceptible check Vandana.

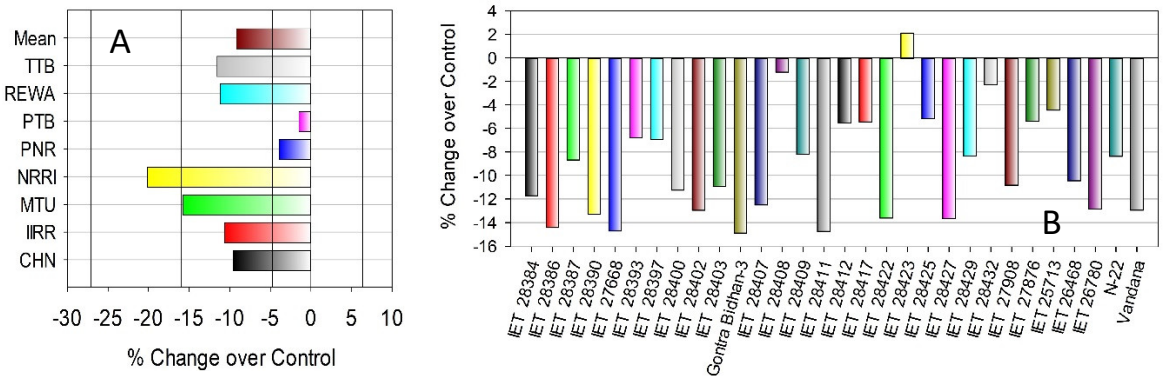


Fig.6.3.11 : Influence of high temperature on 1000 grain weight (g)in different rice genotypes during Kharif-2019 season. Each bar represents % change in 1000 grain weight under high temperature in comparison with ambient control temperature (A) Mean of all genotypes (B) Mean of all locations

Exposure to high temperature during reproductive stage of rice crop resulted in significant ($p<0.01$) reduction in 1000 grain weight (*Table 6.3.18).* The mean 1000 grain weight was reduced by <9.0% under high tempeatue stress in comparison with control treatment. The interaction between Treatment x Location was found to be significant ($p<0.01$). Maximum reduction in test weight was obsered at NRRI followed by MTU and TTB. The reduction is <5% over control at PTB and PNR centres (Fig. 11). Significant differences were observed amongst the tested entries in their response to exposure to high temperature. In entries IET28408, IET28412, IET 28417, IET28432, IET28422, IET28425, IET28423, IET27876, and IET 26413 the reduction in 1000 grain weight was less than the tolerant check N-22. All other entiries show significant reduction in test weight which is either at par or higher than the susceptible check Vandana *(Fig. 6.3.11)*

Exposure to high temperatue during reprodutive stage of rice crop significantly ($p<0.05$) influenced the grain yield *(Table 6.3.17).* High temperatue stress resulted in >35% reduction in grain yield in comparison with the control treatment. Significant ($p<0.01$)

Treatment x Location interaction was observed indicating that the treatment effect is not uniform across the locations (*Table6.3.17).* The reduction in grain yield due to exposure to high temperature was maximum at NRRI followed by REWA and PTB. The reduction of minimum in MTU followed by CHN centre (Fig.6.3.12A).

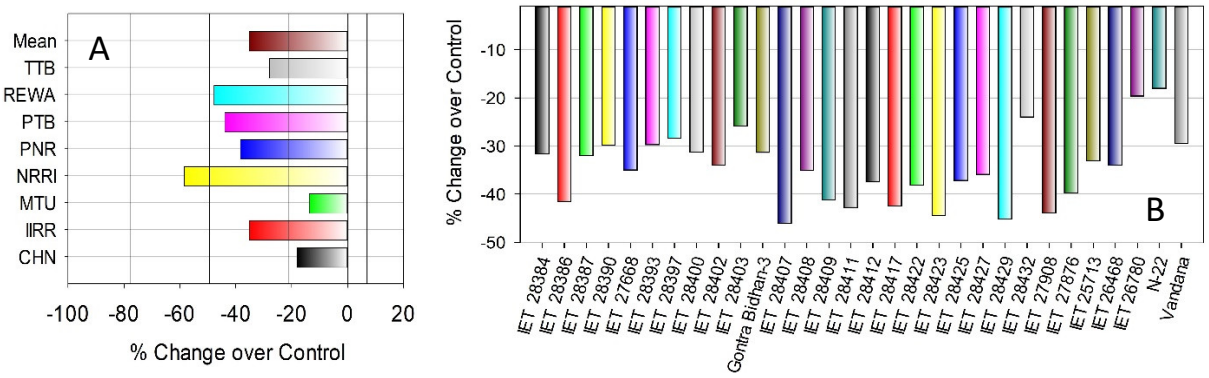


Fig.6.3.12: Influence of high temperature on Grain Yield (g/m^2) in different rice genotypes during Kharif-2019 season. Each bar represents % change in 1000 grain weight under high temperature in comparison with ambient control temperature. (A) Mean of all genotypes (B) Mean of all lcoations

Significant differences were observed amongst the genotypes for mean grain yield *(Fig. 6.3.12).* The results show all the tested genotypes suffered substantial yield loss under high temperature condition. None of the tested entries performed better than the tolerant check N-22 (>17% reduction over control) in terms of grain yield. Only IET26780 with 19.5% reduction and IET28403 (>25% reduction over control) showed any tolerance to high temperature. These entries may be considered as moderately tolerant. All the remaining entries showed substantial yield reduction under high temperature condition. The reduction is higher than the susceptible check Vandana (>29% reduction in yield in relation to control treatment).

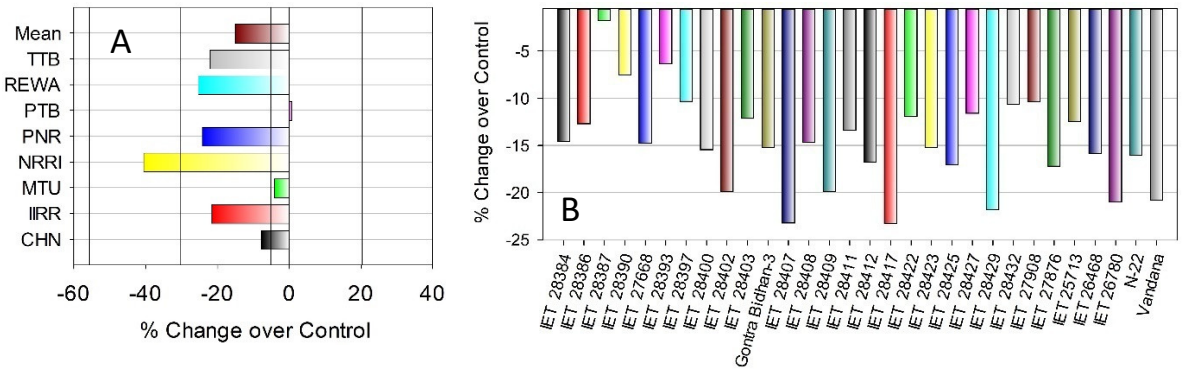


Fig.6.3.13: Influence of high temperature on Harvest Index (%) in different rice genotypes during Kharif-2019 season. Each bar represents % change harvest index under high temperature in comparison with ambient control temperature (A) Mean of all genotypes (B) Mean of all locations

Exposure to high temperature during reproductive growth period significantly (14% reduction in comparison with control) reduced the harvest index (HI). The reduction in HI is not uniform across the locations as indicated by significant ($p<0.01$) interaction between Treatment x Location (*Fig.6.3.13 & Table 6.3. 19*). HI was not affected by high temperature stress at PTB centre and at CHN and MTU the reduction in HI over control was <6%. Maximum reduction was observed at NRRI centre *(Fig 6.3.13A).* Significant differences were observed in mean HI amongst the genotypes. All the tested entries recorded significant reduction in HI. In most entries the reduction is <17% including tolerant check N-22. The Mean HI was not affected by high temperature in IET 28387, IET 28393 and IET 28397 in which the reduction in HI is <10% over control which is less than the reduction suffered by N-22 (Table).

In order to identify genotypes tolerant to high temperature, different indices were computed based on the grain yield recorded under ambient (control) and high temperature conditions. Different heat indices including Heat susceptibility index (HSI), Relative Heat index (RHI), Heat tolerance index (HTI), Geometric mean productivity (GMP), Tolerance (TOL), Mean production (MP), Yield index (YI), Heat resistance index (HI), Yield stability index (YSI), Modified stress tolerance index (KiSTI), were calculated following the equations published (Fischer and Maurer, 1978; Fischer et al., 1998; Fernandez, 1992; Rosielle and Hamblin, 1981; Bouslama and Schapaugh, 1984; Blum, 1988; Moosavi et al., 2008; Farshadfar and Sutka, 2002). The results are presented in Table (6.3.20) . Significant Variation was observed amongst the genotypes for most of the indices. The genotypes were ranked for each index and rank-sum and mean rank for each genotype was calculated. The genotype with high mean rank and low SEm± was considered as heat tolerant genotype. Based on the mean rank IET28387, IET28390, IET28393, IET28397, IET28403, Gontra bidhan-3 and IET28432 performed better than the tolerant check N-22. These entries may be considered as relatively heat tolerant.

To determine the most desirable heat stress tolerant criteria, the correlation coefficients between Ys, and other quantitative indices of heat tolerance were calculated. The correlation analysis between grain yield and heat tolerance indices can be a good criterion for screening the best cultivars and indices used. A suitable index must have a significant association with yield recorded under stress condition {*Table 6.3.21}* presents the results of correlation analysis which indicate that the indices like GMP(Geometric Mean

Production),HM (Hormonic Mean), K2STI (Modified Stress Tolerance Index), Yield index (YI) showed highly significant positive association with grain yield recorded under stress condition. These indices are useful in selecting suitable genotypes for heat tolerance. When the analysis was done with data collected from IIRR the relationships between tolerance indices and grain yield recorded under stress show stronger relationships (*Fig.6.3.14).*

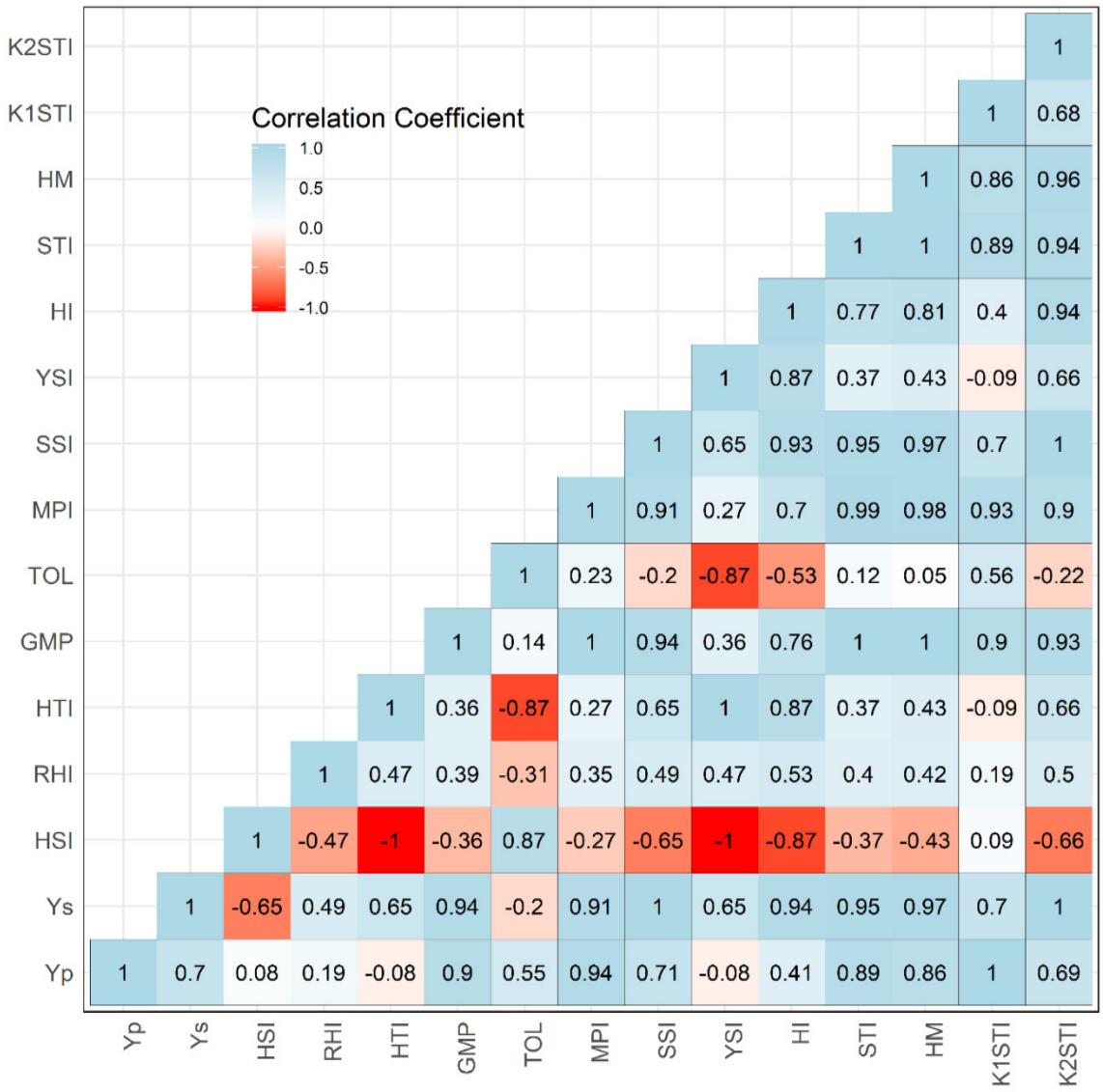


Fig. 6.3.14 Relation between yield under stress (Ys) and other heat tolerance indices. Mean yield recorded at different locations was used to compute the indices.

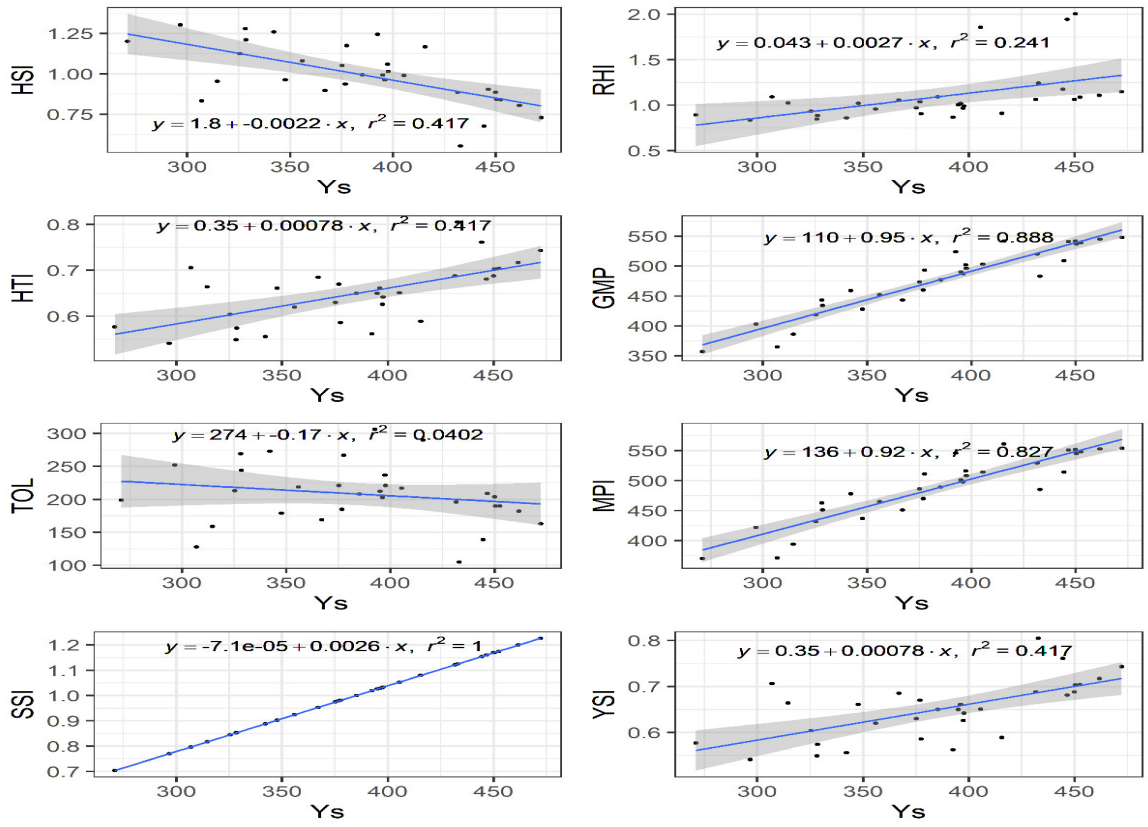


Fig.6.3.15 Relationship between heat tolerance indices and yield recorded under heat stress condition (Ys). Average yield recorded under both control and heat stress treatments at different locations was used to compute various heat tolerance indices.

Selection for high yield and stability of performance under elevated temperature:

In order to simultaneously select genotypes with higher yield and stability of performance across locations under elevated temperature conditions, a parametric model for simultaneous selection in yield and stability "shukla's stability variance and kang's" statistic was performed and the results were presented in (Table). Based on the YS_i values genotypes can be selected as they produced relatively higher yield under heat stress condition and also they show non-significant stability variance (σ_i^2). These genotypes have a higher yield and a lower variation. According to the ANOVA, the interaction is significant.

Based on stability variance and stability rating IET 28386, 28387,28390, 27668, 28393, 28397, 28400, 28403, Gontra bidhan-3, IET28408, 28409, 28511, 28422, 28425, 27908 and IET25713 performed well and are selected as genotypes with high yield and stability.

Summary & Conclusions

Covering the field grown crop with polythene supported by metal frame immediately after PI stage had resulted in an increase in temperature inside the tunnel. The increase in temperature is <4.0 C at most of the centres with an exception at IIRR, PTB and PNR where the temperature difference is >8.0 C. The results show all the tested genotypes suffered substantial yield loss under high temperature condition. None of the tested entries performed better than the tolerant check N-22 (>17% reduction over control) in terms of grain yield. Only IET26780 with 19.5% reduction and IET28403 (>25% reduction over control) showed any tolerance to high temperature. These entries may be considered as moderately tolerant. The grain yield recorded under elevated temperature showed strong association with GMP, YI, MP, K2STI and HIS and these indices are useful in screening for high temperature tolerance. The genotypes were ranked for each index and rank-sum and mean rank for each genotype was calculated. The genotype with high mean rank and low SEm± was considered as heat tolerant genotype. Based on the mean rank IET28387, IET28390, IET28393, IET28397, IET28403, Gontra bidhan-3 and IET28432 performed better than the tolerant check N-22. These entries may be considered as relatively heat tolerant. Stability analysis was performed to identify genotypes which produced high yield and high stability. Based on stability variance and stability rating IET 28386, 28387,28390, 27668, 28393, 28397, 28400, 28403, Gontra bidhan-3, IET28408, 28409, 28511, 28422, 28425, 27908 and IET25713 performed well and are selected as genotypes with high yield . However, in IET 28407 and IET27876 show non-significant stability variance (σ_i^2) .

Simultaneous selection for yield and stability under high temperature regimes

Genotypes	***Mean yield***	***Yield Rank (Y^n)***	***Adjusted$ Y^n***	***Adjusted Y***	***Stability variance (σ_i^2)***	***Stability Rating (S)***	***Ys_i = (Y + S)***	…
IET 28384	407.1	13	-1	12	14611	-4	8	
IET 28386	457.2	24	2	26	28394	-8	18	+
IET 28387	510.5	30	3	33	46669	-8	25	+
IET 28390	494.5	29	3	32	62463	-8	24	+
IET 27668	447.1	21	1	22	46002	-8	14	+
IET 28393	485.9	26	2	28	62979	-8	20	+
IET 28397	490.9	28	2	30	26989	-8	22	+
IET 28400	455.3	23	2	25	40495	-8	17	+
IET 28402	400.3	11	-1	10	26118	-8	2	
IET 28403	489.1	27	2	29	27592	-8	21	+
Gontra Bidhan-3	443.5	20	1	21	56922	-8	13	+
IET 28407	327.4	4	-3	1	13555	-2	-1	
IET 28408	417.9	15	1	16	14514	-4	12	+
IET 28409	477.5	25	2	27	50650	-8	19	+
IET 28411	419.4	16	1	17	85322	-8	9	+
IET 28412	399.8	10	-1	9	28775	-8	1	
IET 28417	312.2	2	-3	-1	22921	-8	-9	
IET 28422	442.5	18	1	19	75046	-8	11	+
IET 28423	361.7	7	-2	5	28344	-8	-3	
IET 28425	447.8	22	1	23	63314	-8	15	+
IET 28427	415.5	14	1	15	20691	-8	7	
IET 28429	340.3	5	-2	3	37442	-8	-5	
IET 28432	400.3	12	-1	11	20794	-8	3	
IET 27908	424.8	17	1	18	88886	-8	10	+
IET 27876	363.4	8	-2	6	6562	0	6	
IET 25713	442.6	19	1	20	46461	-8	12	+
IET 26468	354.6	6	-2	4	24261	-8	-4	
IET 26780	378.8	9	-1	8	58244	-8	0	
N-22	319.5	3	-3	0	12403	-2	-2	
Vandana	275	1	-3	-2	62852	-8	-10	
Yield Mean	**413.4**							
YS Mean	8.5							
LSD (p<0.05)	39.2							
+ Selected Genotypes								

Table 6.3.1 Influence of Heat Stress on Days to flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control								Grand Mean	Treated								Grand Mean
		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	100	116	91	101	88	77	95	108	97	99	114	88	100	90	76	96	106	96
2	IET 28386	101	116	91	102	88	73	96	99	96	100	114	89	102	88	69	96	98	95
3	IET 28387	103	119	91	103	86	82	99	107	99	102	117	89	107	91	82	98	106	99
4	IET 28390	100	116	89	100	87	83	94	93	95	100	113	91	100	89	78	96	91	95
5	IET 27668	99	116	86	101	86	73	93	98	94	100	114	86	101	91	65	95	97	93
6	IET 28393	99	115	87	102	85	67	107	108	96	99	113	87	105	91	62	108	106	96
7	IET 28397	102	123	87	102	88	64	104	103	97	103	121	86	100	93	59	104	102	96
8	IET 28400	101	116	84	97	80	70	104	93	93	101	114	81	105	91	64	104	91	94
9	IET 28402	100	109	85	101	89	73	108	98	95	99	106	81	102	89	65	107	97	93
10	IET 28403	99	115	86	104	87	77	110	97	97	99	113	83	100	86	77	110	97	96
11	Gontra Bidhan-3	100	108	82	100	86	77	99	99	94	101	107	82	100	90	73	100	97	94
12	IET 28407	103	119	93	100	88	83	102	115	100	102	116	91	113	88	80	99	113	100
13	IET 28408	103	115	84	105	88	82	102	110	99	102	113	83	109	91	77	101	108	98
14	IET 28409	102	119	92	107	88	67	103	112	99	104	116	88	107	91	63	103	110	98
15	IET 28411	99	119	94	106	91	69	99	103	97	99	117	91	109	94	63	100	102	97
16	IET 28412	97	116	88	102	88	67	95	98	94	99	114	85	102	91	59	97	97	93
17	IET 28417	95	106	80	96	88	73	93	97	91	96	104	79	102	84	69	96	97	91
18	IET 28422	102	123	92	105	94	77	106	111	101	103	121	89	107	86	77	106	110	100
19	IET 28423	103	116	86	107	85	95	103	114	101	103	114	91	107	90	67	105	113	99
20	IET 28425	100	119	91	102	81	73	102	100	96	99	117	91	107	89	69	103	98	97
21	IET 28427	103	116	91	105	88	70	103	99	97	103	114	92	107	89	63	103	97	96
22	IET 28429	103	115	88	105	84	83	104	104	98	103	113	86	109	92	77	104	102	98
23	IET 28432	98	116	89	107	94	63	96	91	94	97	114	82	101	90	59	96	89	91
24	IET 27908	105	123	84	105	85	73	100	114	99	101	120	84	107	94	76	97	113	99
25	IET 27876	94	108	84	99	86	69	94	94	91	94	107	81	100	90	68	95	91	91
26	IET 25713	102	109	84	100	89	77	94	92	94	102	107	81	100	92	76	96	91	93
27	IET 26468	103	109	88	100	89	77	93	93	94	104	107	86	103	90	76	94	91	94
28	IET 26780	101	110	87	100	86	77	96	92	94	101	108	82	101	90	77	96	91	93
29	N-22	91	106	81	106	90	65	79	91	89	91	104	80	108	91	59	79	89	88
30	Vandana	82	106	78	96	89	61	78	101	86	72	104	76	102	92	59	78	100	85
	Mean	**100**	**115**	**87**	**102**	**87**	**74**	**98**	**101**	**96**	**99**	**113**	**85**	**104**	**90**	**69**	**99**	**100**	**95**
	LSD (Treatment)				NS						LSD (Treatment x Genotype)					ns			
	LSD (Location x Treatment)				0.81**						LSD (Location x Treatment x Genotype)					ns			
	LSD (Genotype)				1.11**						CV (%)					2			
	LSD (Location x Genotype)				3.15**														

Table 6.3.2 Influence of Heat Stress on Days to Maturity in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control								Grand Mean	Treated								Grand Mean
		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	131	149	120	138	119	120	117	137	129	129	146	117	133	118	113	121	135	127
2	IET 28386	130	150	120	139	120	120	117	131	128	130	147	119	135	117	113	118	129	126
3	IET 28387	133	152	120	140	117	120	115	137	129	133	149	117	140	119	119	117	135	129
4	IET 28390	130	148	118	137	118	120	117	126	127	130	146	121	133	116	113	122	122	126
5	IET 27668	130	148	116	138	117	120	116	127	127	130	146	115	134	117	113	117	125	125
6	IET 28393	129	147	117	139	115	120	123	138	129	130	145	117	138	116	113	125	135	127
7	IET 28397	133	153	116	139	120	120	117	135	129	133	153	115	133	118	113	124	132	128
8	IET 28400	132	149	114	134	108	120	122	123	125	131	146	113	138	115	113	126	121	125
9	IET 28402	131	137	115	138	120	120	125	127	127	129	139	110	135	117	113	128	124	124
10	IET 28403	130	148	116	141	118	120	125	129	128	129	142	111	133	114	119	126	127	125
11	Gontra Bidhan-3	131	138	111	137	115	120	118	129	125	131	139	111	133	116	113	122	126	124
12	IET 28407	133	151	122	137	110	120	123	145	130	133	148	120	146	116	119	124	142	131
13	IET 28408	133	147	113	142	118	120	123	140	129	132	146	112	142	118	119	125	137	129
14	IET 28409	134	151	121	144	119	120	123	142	132	134	148	118	140	119	113	125	140	130
15	IET 28411	130	150	123	143	122	120	119	132	130	129	149	121	142	122	113	119	130	128
16	IET 28412	127	148	117	139	119	120	117	127	127	129	147	115	135	119	113	121	125	126
17	IET 28417	125	135	109	133	115	120	117	126	123	127	137	116	135	108	113	124	125	123
18	IET 28422	133	153	122	142	117	120	124	141	131	132	154	119	140	114	119	128	138	130
19	IET 28423	132	116	115	144	115	120	118	143	126	133	147	121	140	118	113	122	140	129
20	IET 28425	131	119	120	139	109	120	123	129	124	130	149	121	140	113	113	124	126	127
21	IET 28427	133	149	120	142	119	120	118	128	129	133	147	121	140	117	113	122	125	127
22	IET 28429	133	146	117	142	114	120	123	136	129	132	145	113	142	118	119	125	132	128
23	IET 28432	129	147	118	144	124	120	118	121	128	127	146	112	134	117	119	118	118	124
24	IET 27908	132	153	114	142	114	120	115	146	130	132	152	114	140	118	119	116	142	129
25	IET 27876	125	137	113	136	115	120	117	126	124	124	139	110	133	116	119	120	123	123
26	IET 25713	133	137	114	137	120	120	116	124	125	132	139	110	133	116	113	119	120	123
27	IET 26468	134	138	117	137	120	120	115	123	125	134	139	115	136	114	113	117	119	123
28	IET 26780	132	137	117	137	117	120	117	124	125	132	140	112	134	117	119	121	121	125
29	N-22	122	135	111	143	121	120	113	122	123	122	136	110	141	118	119	115	117	122
30	Vandana	112	135	107	133	120	120	113	131	121	101	136	105	135	118	119	116	127	120
	Mean	**130**	**143**	**117**	**139**	**117**	**120**	**119**	**132**	**127**	**130**	**145**	**115**	**137**	**117**	**115**	**122**	**129**	**126**
	LSD (Treatment)					NS					LSD (Treatment x Genotype)						ns		
	LSD (Location x Treatment)					0.85**					LSD (Location x Treatment x Genotype)						ns		
	LSD (Genotype)					1.17**					CV (%)						1.75		
	LSD (Location x Genotype)					3.30**													

Table 6.3.3 Influence of Heat Stress on plant height (cm) flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control								Grand Mean	Treated								Grand Mean
		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	111.3	117.2	159.7	108.3	116.3	87.3	126.0	117.2	117.9	109.7	131.2	168.7	111.3	125.3	96.7	122.0	115.7	122.6
2	IET 28386	102.7	100.3	144.0	104.8	113.0	96.0	131.7	91.7	110.5	102.7	105.2	141.7	109.8	111.0	120.0	130.3	93.7	114.3
3	IET 28387	103.3	96.5	130.0	107.2	98.7	85.0	116.3	105.0	105.3	100.7	105.2	127.7	116.4	112.7	91.7	110.3	107.3	109.0
4	IET 28390	108.7	121.0	142.7	118.9	113.7	76.7	126.3	111.3	114.9	106.7	124.8	159.3	117.4	108.7	105.0	124.0	116.7	120.3
5	IET 27668	103.0	103.0	158.0	101.8	104.7	95.3	124.7	103.7	111.8	102.7	109.2	153.3	99.6	122.7	108.0	123.3	105.3	115.5
6	IET 28393	104.0	99.5	150.0	111.1	85.7	93.3	113.0	95.2	106.5	103.0	101.7	152.7	112.0	82.0	121.7	111.0	121.3	113.2
7	IET 28397	110.7	121.7	148.3	119.5	136.8	84.3	106.0	109.3	117.1	105.0	127.8	150.0	110.7	112.3	110.0	103.7	123.0	117.8
8	IET 28400	103.7	97.8	155.3	102.5	116.7	75.0	121.0	100.5	109.1	102.3	107.3	138.7	112.2	109.3	115.0	120.3	112.7	114.7
9	IET 28402	89.0	95.0	137.5	82.9	91.6	45.7	126.0	87.2	94.4	85.7	97.7	151.3	91.7	126.0	94.3	124.7	105.3	109.6
10	IET 28403	97.0	98.5	144.3	105.0	104.3	64.3	119.3	86.5	102.4	95.3	104.2	147.7	109.6	105.7	103.0	115.3	104.0	110.6
11	Gontra Bidhan-3	92.3	99.2	151.5	95.7	104.7	83.3	124.0	96.2	105.9	94.0	109.2	142.3	95.0	116.3	115.7	122.3	97.2	111.5
12	IET 28407	95.8	99.5	135.0	97.0	103.0	94.3	116.0	93.3	104.2	84.3	105.2	124.3	88.6	95.7	98.3	112.7	86.3	99.4
13	IET 28408	96.0	90.3	132.3	106.9	85.3	71.3	107.3	85.2	96.8	95.3	105.0	129.0	101.9	81.7	113.3	106.0	96.3	103.6
14	IET 28409	103.3	101.7	172.0	127.2	101.7	82.0	111.0	110.7	113.7	103.0	115.5	172.3	125.5	96.7	110.3	107.0	109.7	117.5
15	IET 28411	96.3	102.5	144.0	122.1	100.7	42.0	124.3	104.3	104.5	100.3	107.0	154.3	104.6	102.0	111.7	122.7	105.0	113.4
16	IET 28412	93.0	93.5	122.7	103.7	88.2	64.7	101.7	91.0	94.8	95.0	99.5	120.3	111.8	99.3	95.7	102.0	101.0	103.1
17	IET 28417	95.7	88.5	139.3	98.3	97.7	75.3	104.7	79.2	97.3	98.7	100.2	132.7	97.0	112.0	79.0	103.7	99.3	102.8
18	IET 28422	92.7	101.3	125.3	104.8	118.0	106.7	117.3	101.3	108.4	95.7	103.0	133.7	96.7	108.3	103.5	114.7	102.3	107.2
19	IET 28423	104.0	101.3	156.5	106.2	97.7	84.0	105.7	101.5	107.1	102.0	110.0	120.0	94.1	105.3	112.0	104.3	108.0	107.0
20	IET 28425	103.0	106.8	144.7	114.9	116.0	95.7	117.7	102.7	112.7	104.0	114.7	152.0	108.4	113.0	111.0	119.0	108.0	116.3
21	IET 28427	101.0	100.0	136.0	106.0	107.3	93.3	115.3	97.2	107.0	100.7	116.2	129.0	108.9	97.7	93.3	112.7	109.0	108.4
22	IET 28429	101.0	102.3	123.3	115.8	102.3	90.7	108.7	110.7	106.9	102.3	130.5	128.7	111.1	107.7	81.7	108.3	112.7	110.4
23	IET 28432	116.7	102.7	138.0	118.1	136.7	95.0	107.3	126.8	117.7	111.7	110.3	145.3	129.8	108.7	113.3	104.3	116.3	117.5
24	IET 27908	108.7	111.5	161.0	119.9	135.5	80.0	104.0	109.7	116.3	103.0	112.8	150.0	119.9	102.7	116.7	98.7	127.0	116.3
25	IET 27876	98.0	93.5	131.0	96.3	93.7	75.3	105.3	90.7	98.0	99.7	96.5	155.3	90.2	97.3	90.0	103.7	108.3	105.1
26	IET 25713	90.0	90.7	135.0	100.2	86.2	100.0	108.3	91.2	100.2	98.3	98.3	121.0	97.5	130.5	85.3	104.0	95.8	103.9
27	IET 26468	95.0	95.0	131.0	97.9	124.2	96.3	114.7	90.8	105.6	97.0	102.2	139.3	86.7	105.7	95.3	113.3	97.3	104.6
28	IET 26780	93.0	92.8	159.3	90.7	94.7	94.0	130.3	81.5	104.5	88.7	98.3	135.0	88.7	131.8	91.7	131.7	93.7	107.4
29	N-22	87.3	93.3	132.7	83.4	93.7	90.0	118.0	72.0	96.3	87.7	101.7	132.0	93.0	103.7	95.7	118.0	92.7	103.0
30	Vandana	92.7	90.7	127.7	112.5	100.3	99.3	104.0	98.7	103.2	88.0	107.0	142.7	106.4	101.0	128.3	103.0	111.0	110.9
	Mean	**99.6**	**100.3**	**142.3**	**106.0**	**105.6**	**83.9**	**115.2**	**98.1**	**106.4**	**98.8**	**108.6**	**141.7**	**104.9**	**107.8**	**103.6**	**113.2**	**106.1**	**110.6**
	LSD (Treatment)					NS					LSD (Treatment x Genotype)						ns		
	LSD (Location x Treatment)					2.887**					LSD (Location x Treatment x Genotype)						ns		
	LSD (Genotype)					3.953**					CV (%)						6.92		
	LSD (Location x Genotype)					11.18**													

Table 6.3.4 Influence of Heat Stress on Leaf Area Index flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control					Grand Mean	Treated					Grand Mean
		IIRR	NRRI	PNR	PTB	REWA		IIRR	NRRI	PNR	PTB	REWA	
1	IET 28384	3.59	3.87	3.31	3.50	6.11	4.08	5.89	2.17	4.15	3.73	4.42	4.07
2	IET 28386	5.39	5.94	1.67	3.40	6.26	4.53	6.03	3.78	2.87	2.63	4.64	3.99
3	IET 28387	4.60	5.25	4.24	1.63	6.79	4.50	5.61	3.02	5.44	2.70	5.75	4.50
4	IET 28390	5.74	5.07	4.07	2.10	5.70	4.54	5.36	3.49	5.31	1.67	5.06	4.18
5	IET 27668	5.18	5.21	2.60	3.43	6.60	4.60	5.31	2.93	3.82	2.97	5.27	4.06
6	IET 28393	4.09	5.29	1.89	3.53	5.06	3.97	4.12	3.36	3.09	2.37	3.42	3.27
7	IET 28397	6.05	6.10	2.38	3.50	6.39	4.88	6.38	3.47	3.65	6.80	4.69	5.00
8	IET 28400	4.21	4.53	3.74	3.97	4.86	4.26	5.56	3.13	5.10	2.20	3.45	3.89
9	IET 28402	4.40	5.84	1.41	1.87	7.50	4.20	4.67	4.07	2.69	2.20	6.29	3.98
10	IET 28403	4.14	5.77	3.56	1.57	6.24	4.26	4.92	4.01	4.70	2.03	4.74	4.08
11	Gontra Bidhan-3	3.73	4.79	2.56	2.23	6.58	3.98	3.34	3.31	3.46	2.57	5.34	3.60
12	IET 28407	6.10	3.86	5.15	3.50	6.26	4.97	6.09	2.17	6.53	3.27	5.41	4.70
13	IET 28408	3.82	4.85	2.52	3.03	5.31	3.91	5.51	3.09	3.30	2.57	4.44	3.78
14	IET 28409	5.07	5.06	5.23	2.80	5.32	4.70	5.11	3.51	6.43	3.03	4.34	4.48
15	IET 28411	3.95	5.88	3.48	2.10	6.47	4.37	5.09	3.34	4.63	3.03	5.14	4.25
16	IET 28412	4.26	4.92	1.22	2.60	4.81	3.56	4.78	3.13	2.60	2.30	3.27	3.22
17	IET 28417	3.63	4.03	2.75	1.50	4.46	3.27	5.51	2.27	4.03	2.80	2.57	3.44
18	IET 28422	7.00	4.07	3.79	4.40	5.71	4.99	6.55	2.83	4.99	2.57	4.25	4.24
19	IET 28423	6.48	4.85	4.39	5.20	5.88	5.36	4.35	3.37	5.59	1.73	4.53	3.92
20	IET 28425	6.08	3.88	4.34	3.50	5.86	4.73	6.59	2.19	5.54	3.30	4.56	4.44
21	IET 28427	4.03	3.62	2.28	3.80	6.59	4.06	6.64	2.31	3.48	3.27	5.24	4.19
22	IET 28429	6.07	3.79	3.29	3.07	5.44	4.33	5.79	2.13	4.49	2.97	4.31	3.94
23	IET 28432	3.95	4.99	3.48	2.83	6.43	4.34	5.62	3.18	4.68	4.07	5.18	4.54
24	IET 27908	5.78	3.81	2.88	4.20	6.72	4.68	7.04	2.64	4.08	2.40	5.44	4.32
25	IET 27876	4.28	6.12	4.54	4.43	6.31	5.14	4.61	4.24	5.95	2.40	5.42	4.52
26	IET 25713	5.19	5.39	1.42	3.17	4.19	3.87	4.69	3.01	2.62	2.97	2.78	3.21
27	IET 26468	4.83	5.32	1.69	3.07	5.88	4.16	4.44	3.38	2.89	2.53	5.23	3.69
28	IET 26780	3.20	4.28	4.60	3.23	6.37	4.34	3.83	2.96	5.80	2.50	4.07	3.83
29	N-22	3.64	5.77	2.65	3.87	6.88	4.56	3.75	3.99	3.73	2.87	4.93	3.85
30	Vandana	3.64	5.52	3.37	3.27	4.90	4.14	4.08	3.10	4.57	3.27	3.83	3.77
	Mean	**4.74**	**4.92**	**3.15**	**3.14**	**5.93**	**4.38**	**5.24**	**3.12**	**4.34**	**2.86**	**4.60**	**4.03**
	LSD (Treatment)			ns				LSD (Treatment x Genotype)				ns	
	LSD (Location x Treatment)			0.300**				LSD (Location x Treatment x Genotype)				ns	
	LSD (Genotype)			ns				CV (%)				18.53	
	LSD (Location x Genotype)			1.16**									

Table 6.3.5 Influence of Heat Stress on Leaf weight (g/m2) flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control						Grand Mean	Treated						Grand Mean
		IIRR	NRRI	PNR	PTB	REWA	TTB		IIRR	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	142	170	344	165	379	172	229	208	134	360	176	301	106	214
2	IET 28386	243	196	409	385	333	158	287	252	160	435	484	264	107	283
3	IET 28387	209	204	299	66	293	140	202	244	154	331	253	240	150	229
4	IET 28390	246	144	527	99	298	90	234	219	111	516	451	277	95	278
5	IET 27668	219	174	309	539	267	135	274	195	130	259	462	249	106	234
6	IET 28393	177	177	430	561	300	101	291	162	138	371	671	256	69	278
7	IET 28397	240	173	475	165	359	141	259	223	131	478	385	268	104	265
8	IET 28400	210	169	197	187	198	120	180	258	124	200	682	172	103	256
9	IET 28402	191	163	393	88	267	145	208	193	125	404	429	254	123	255
10	IET 28403	170	169	353	44	253	171	193	177	131	290	88	229	144	177
11	Gontra Bidhan-3	197	161	240	66	242	139	174	138	122	300	121	239	95	169
12	IET 28407	295	186	320	165	216	128	218	250	143	352	154	198	126	204
13	IET 28408	165	187	295	143	250	133	195	211	140	271	121	248	126	186
14	IET 28409	206	207	469	132	150	126	215	201	161	448	242	146	63	210
15	IET 28411	172	214	287	99	225	180	196	213	162	259	143	218	104	183
16	IET 28412	172	201	312	44	211	125	178	185	148	296	374	197	117	220
17	IET 28417	159	151	297	44	210	106	161	203	116	267	462	214	81	224
18	IET 28422	352	209	163	528	256	125	272	240	162	190	121	207	106	171
19	IET 28423	284	219	448	363	243	159	286	168	165	414	385	229	150	252
20	IET 28425	300	197	334	165	276	160	239	274	152	269	352	283	172	250
21	IET 28427	171	146	355	671	304	120	295	240	110	320	264	224	89	208
22	IET 28429	233	223	481	407	211	189	291	283	173	399	297	191	135	246
23	IET 28432	194	185	432	363	192	149	253	291	140	386	264	178	119	230
24	IET 27908	285	215	541	198	218	128	264	259	166	521	836	208	117	351
25	IET 27876	164	200	298	209	151	140	194	170	151	304	319	177	91	202
26	IET 25713	219	194	486	693	117	89	300	167	150	449	297	196	81	223
27	IET 26468	208	167	357	633	240	150	292	156	125	337	484	243	105	242
28	IET 26780	154	209	412	638	251	132	299	159	162	354	308	248	96	221
29	N-22	159	174	351	517	225	135	260	155	133	291	484	206	89	226
30	Vandana	165	179	221	154	192	118	171	175	131	161	154	190	99	152
	Mean	**210**	**185**	**361**	**284**	**244**	**137**	**237**	**209**	**142**	**341**	**342**	**225**	**109**	**228**
	LSD (Treatment)				ns				LSD (Treatment x Genotype)					ns	
	LSD (Location x Treatment)				26.16**				LSD (Location x Treatment x Genotype)					ns	
	LSD (Genotype)				ns				CV (%)					29.2	
	LSD (Location x Genotype)				101.3**										

Table 6.3.6 Influence of Heat Stress on Stem weight (g/m2) flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control						Grand Mean	Treated						Grand Mean
		IIRR	NRRI	PNR	PTB	REWA	TTB		IIRR	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	589	514	688	363	508	504	528	685	338	719	682	364	297	514
2	IET 28386	690	542	819	726	502	345	604	514	397	869	1331	350	281	624
3	IET 28387	528	502	597	66	401	315	402	499	383	662	605	248	263	443
4	IET 28390	820	466	1055	165	316	251	512	463	347	1032	1232	261	234	595
5	IET 27668	618	394	617	1903	383	357	712	448	280	518	1166	293	229	489
6	IET 28393	563	416	859	1782	477	342	740	349	309	742	1793	214	194	600
7	IET 28397	720	703	950	363	541	422	617	729	476	956	869	380	215	604
8	IET 28400	509	529	395	132	472	221	376	548	373	399	1199	267	157	490
9	IET 28402	416	338	786	88	631	334	432	413	253	808	935	324	242	496
10	IET 28403	549	613	706	99	375	299	440	346	438	579	297	256	265	364
11	Gontra Bidhan-3	574	674	480	187	400	249	427	344	505	600	363	265	188	378
12	IET 28407	816	351	641	330	274	381	465	536	247	703	220	189	291	364
13	IET 28408	331	388	590	165	375	314	360	638	288	543	638	243	275	438
14	IET 28409	553	603	938	330	383	254	510	443	412	896	638	355	195	490
15	IET 28411	554	499	574	495	421	431	496	461	379	518	781	211	310	443
16	IET 28412	571	379	624	55	421	377	405	486	265	593	1001	323	295	494
17	IET 28417	335	432	594	66	289	313	338	343	313	533	1342	260	192	497
18	IET 28422	967	433	325	2134	502	374	789	345	309	380	330	318	254	323
19	IET 28423	668	297	896	1144	466	480	659	368	223	828	1265	349	309	557
20	IET 28425	960	601	668	319	503	377	571	513	432	537	1144	282	290	533
21	IET 28427	415	429	711	1771	592	302	703	576	322	640	704	412	213	478
22	IET 28429	616	550	961	1661	329	342	743	648	346	797	1001	242	289	554
23	IET 28432	614	283	865	1265	476	346	642	482	199	772	1232	406	324	569
24	IET 27908	803	482	1081	946	509	323	691	364	365	1043	2310	334	295	785
25	IET 27876	407	400	596	1804	356	326	648	328	286	607	1089	433	195	490
26	IET 25713	473	412	972	2706	529	322	902	266	309	897	693	451	195	468
27	IET 26468	498	394	714	8352	364	320	1773	330	288	674	1232	287	212	504
28	IET 26780	383	396	823	1980	303	255	690	368	300	708	704	460	181	454
29	N-22	471	394	703	2013	507	304	732	383	274	582	990	420	282	488
30	Vandana	403	429	441	1056	374	238	490	405	329	321	814	296	214	397
	Mean	**580**	**462**	**722**	**1149**	**433**	**334**	**613**	**454**	**333**	**682**	**953**	**316**	**246**	**497**
	LSD (Treatment)				86.6**					LSD (Treatment x Genotype)				ns	
	LSD (Location x Treatment)				ns					LSD (Location x Treatment x Genotype)				ns	
	LSD (Genotype)				ns					CV (%)				29.2	
	LSD (Location x Genotype)				821**										

Table 6.3.7 Influence of Heat Stress on Panicle weight (g/m2) flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control						Grand Mean	Treated						Grand Mean
		IIRR	NRRI	PNR	PTB	REWA	TTB		IIRR	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	123	139	328	66	189	220	177	148	89	241	66	109	182	139
2	IET 28386	233	212	414	165	169	180	229	139	121	319	297	66	154	183
3	IET 28387	198	213	514	66	128	183	217	187	184	413	121	105	198	201
4	IET 28390	222	151	554	55	192	158	222	118	92	435	154	76	83	160
5	IET 27668	196	119	385	198	188	262	225	131	125	261	517	89	155	213
6	IET 28393	146	201	406	165	199	151	211	102	120	304	407	135	86	192
7	IET 28397	124	91	510	55	192	191	194	128	100	377	187	166	114	179
8	IET 28400	122	92	411	66	169	156	169	188	105	298	407	173	120	215
9	IET 28402	158	105	409	66	197	215	191	184	72	286	176	160	201	180
10	IET 28403	152	200	435	66	143	263	210	91	112	329	341	101	183	193
11	Gontra Bidhan-3	189	220	466	132	189	182	230	146	156	259	451	99	143	209
12	IET 28407	267	94	394	209	177	158	217	128	114	230	341	98	111	170
13	IET 28408	201	161	443	209	162	212	231	209	87	263	418	151	148	213
14	IET 28409	151	155	567	132	117	193	219	110	100	401	165	68	94	156
15	IET 28411	141	216	281	99	150	228	186	103	110	184	649	60	191	216
16	IET 28412	141	234	344	55	138	232	191	147	152	212	429	105	183	205
17	IET 28417	91	78	247	77	264	183	156	118	79	159	275	175	145	158
18	IET 28422	133	105	415	242	81	188	194	56	127	272	418	96	157	188
19	IET 28423	156	53	416	132	191	222	195	61	107	261	352	55	178	169
20	IET 28425	218	122	281	231	164	266	213	135	255	184	110	84	227	166
21	IET 28427	118	121	447	132	194	154	194	113	219	304	176	174	158	191
22	IET 28429	158	86	432	264	149	249	223	118	125	265	319	132	214	196
23	IET 28432	198	133	377	363	213	230	252	103	103	243	286	130	205	178
24	IET 27908	158	189	587	132	232	236	256	72	91	417	165	146	207	183
25	IET 27876	86	88	340	176	233	194	186	87	60	230	154	176	98	134
26	IET 25713	206	175	453	451	265	190	290	55	88	297	143	129	112	137
27	IET 26468	130	50	324	385	178	204	212	93	120	213	374	104	113	170
28	IET 26780	103	151	395	330	153	189	220	83	214	259	231	95	116	166
29	N-22	184	190	379	308	141	193	233	174	73	222	264	102	156	165
30	Vandana	87	196	280	363	187	145	210	119	52	145	99	83	157	109
	Mean	**160**	**145**	**408**	**180**	**178**	**201**	**212**	**121**	**118**	**276**	**283**	**115**	**153**	**178**
	LSD (Treatment)				ns				LSD (Treatment x Genotype)					ns	
	LSD (Location x Treatment)				25.13**				LSD (Location x Treatment x Genotype)					ns	
	LSD (Genotype)				ns				CV (%)					24	
	LSD (Location x Genotype)				97.67**										

Table 6.3.8 Influence of Heat Stress on Total dry matter (g/m2) flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated							Grand Mean
		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	854	400	823	1360	594	1076	896	858	1042	352	561	1320	924	774	584	794
2	IET 28386	1166	427	949	1642	1276	1005	683	1021	905	392	678	1623	2112	680	542	990
3	IET 28387	934	415	920	1410	198	822	639	762	930	370	721	1407	979	593	611	802
4	IET 28390	1287	329	761	2136	319	806	498	877	799	295	550	1983	1837	615	412	927
5	IET 27668	1033	376	688	1311	2640	839	754	1091	774	375	536	1037	2145	630	489	855
6	IET 28393	886	286	794	1695	2508	976	594	1105	613	271	566	1417	2871	605	349	956
7	IET 28397	1084	398	967	1935	583	1092	755	973	1079	365	707	1810	1441	815	432	950
8	IET 28400	841	438	789	1003	385	839	497	684	993	386	602	897	2288	612	380	880
9	IET 28402	765	356	605	1587	242	1095	694	763	791	374	450	1498	1540	738	566	851
10	IET 28403	871	329	982	1494	209	771	733	770	614	350	681	1197	726	586	593	678
11	Gontra Bidhan-3	960	309	1055	1187	385	831	571	757	628	276	783	1159	935	603	426	687
12	IET 28407	1378	348	631	1356	704	667	667	821	914	337	504	1285	715	485	528	681
13	IET 28408	696	343	735	1327	517	787	659	724	1058	356	515	1078	1177	642	549	768
14	IET 28409	910	375	965	1974	594	650	573	863	754	351	672	1746	1045	569	352	784
15	IET 28411	867	314	929	1143	693	796	839	797	778	302	650	961	1573	488	604	765
16	IET 28412	884	387	815	1280	154	770	734	718	817	384	565	1101	1804	626	595	842
17	IET 28417	585	323	660	1137	187	763	602	608	663	323	508	959	2079	648	419	800
18	IET 28422	1452	375	747	903	2904	838	687	1129	641	355	598	841	869	622	517	635
19	IET 28423	1109	326	569	1760	1639	900	860	1023	596	278	495	1504	2002	634	637	878
20	IET 28425	1477	321	920	1283	715	944	803	923	921	282	839	990	1606	649	690	854
21	IET 28427	704	343	696	1513	2574	1090	576	1071	928	317	652	1264	1144	810	460	796
22	IET 28429	1007	389	860	1874	2332	689	780	1133	1049	308	645	1461	1617	566	639	898
23	IET 28432	1006	375	602	1675	1991	882	725	1036	876	367	441	1401	1782	715	648	890
24	IET 27908	1246	372	886	2209	1276	960	688	1091	695	305	623	1982	3311	689	619	1175
25	IET 27876	656	309	689	1234	2189	741	661	926	584	289	497	1141	1562	786	384	749
26	IET 25713	897	377	782	1911	3850	911	601	1333	488	336	547	1643	1133	776	388	759
27	IET 26468	835	283	611	1395	9370	781	674	1993	579	240	534	1224	2090	633	430	819
28	IET 26780	640	313	755	1629	2948	707	576	1081	609	322	676	1322	1243	804	393	767
29	N-22	814	365	758	1433	2838	872	632	1102	713	336	479	1095	1738	729	527	802
30	Vandana	654	409	804	942	1573	754	500	805	699	382	512	627	1067	569	470	618
	Mean	**950**	**357**	**792**	**1491**	**1613**	**855**	**672**	**961**	**784**	**333**	**593**	**1299**	**1579**	**656**	**508**	**822**
	LSD (Treatment)				79.31**					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				ns					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				ns					CV (%)					29.6		
	LSD (Location x Genotype)				814**												

Table 6.3.9 Influence of Heat Stress on Shoot weight (g/m2) maturity in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control								Grand Mean	Treated								Grand Mean
		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	862	625	502	667	1413	2840	568	788	1033	863	526	489	601	1373	1131	425	522	741
2	IET 28386	569	474	573	651	1692	777	559	681	747	568	401	549	585	1673	1380	407	543	763
3	IET 28387	744	429	558	543	1465	2223	462	795	902	802	432	519	488	1462	1402	305	716	766
4	IET 28390	794	614	414	813	2187	1510	373	1021	966	786	681	374	731	2034	1950	324	818	962
5	IET 27668	643	537	515	726	1367	1780	440	983	874	662	606	509	652	1093	1905	353	848	829
6	IET 28393	712	619	368	801	1752	2186	540	633	951	677	547	341	720	1474	2029	274	811	859
7	IET 28397	890	715	516	900	1987	1309	601	808	966	810	639	511	809	1862	1896	442	748	964
8	IET 28400	676	500	590	616	1053	898	532	531	674	636	633	543	553	947	1991	327	712	793
9	IET 28402	606	470	497	818	1638	741	693	991	807	528	546	489	735	1549	1544	386	693	809
10	IET 28403	697	626	441	721	1547	1259	435	991	840	577	638	434	649	1250	1251	316	624	717
11	Gontra Bidhan-3	591	592	382	637	1244	637	462	722	658	457	560	319	574	1216	2010	322	603	758
12	IET 28407	778	615	430	573	1413	680	334	778	700	741	487	426	516	1342	1140	250	667	696
13	IET 28408	712	581	422	755	1383	634	432	732	706	672	408	440	680	1134	1115	301	717	683
14	IET 28409	753	575	470	806	2026	871	444	810	844	752	561	434	727	1798	2091	412	547	915
15	IET 28411	620	549	384	694	1194	1535	478	926	797	554	588	375	625	1012	2701	273	642	846
16	IET 28412	499	646	486	524	1337	522	478	858	669	484	538	482	472	1158	2047	383	668	779
17	IET 28417	573	526	395	491	1187	478	352	619	578	530	639	393	443	1009	1930	320	614	735
18	IET 28422	922	669	468	869	953	1361	562	503	788	1029	661	440	783	891	2421	380	525	891
19	IET 28423	1023	714	395	803	1818	912	526	753	868	980	609	370	722	1562	3149	409	589	1049
20	IET 28425	557	633	413	732	1334	856	565	847	742	590	609	372	660	1041	1847	344	688	769
21	IET 28427	652	662	445	632	1567	2149	652	473	904	627	527	433	570	1318	2117	472	494	820
22	IET 28429	624	679	503	1181	1927	1333	391	782	928	588	538	393	1064	1514	1758	299	701	857
23	IET 28432	528	728	511	850	1734	1459	536	921	908	559	766	496	766	1460	2361	467	689	946
24	IET 27908	744	782	503	901	2266	907	566	704	922	689	673	393	812	2039	2225	392	634	982
25	IET 27876	740	531	384	589	1285	1212	417	879	755	608	573	388	531	1192	1428	490	695	738
26	IET 25713	660	557	498	543	1966	409	587	619	730	623	472	464	489	1698	1749	514	701	839
27	IET 26468	651	483	377	616	1450	1412	421	750	770	752	647	288	555	1279	1966	350	574	802
28	IET 26780	593	456	415	613	1684	682	365	761	696	584	550	394	553	1377	1818	521	544	793
29	N-22	424	583	466	459	1492	1394	567	823	776	451	445	403	414	1154	2423	481	678	806
30	Vandana	651	526	519	420	994	193	434	862	575	524	768	493	378	679	1273	355	622	637
	Mean	**683**	**590**	**461**	**698**	**1545**	**1172**	**492**	**778**	**803**	**657**	**576**	**432**	**629**	**1353**	**1868**	**376**	**654**	**818**
	LSD (Treatment)					ns					LSD (Treatment x Genotype)						ns		
	LSD (Location x Treatment)					40.75**					LSD (Location x Treatment x Genotype)						ns		
	LSD (Genotype)					55.80**					CV (%)						13.7		
	LSD (Location x Genotype)					157.8**													

Table 6.3.10 Influence of Heat Stress on Panicle weight (g/m2) maturity in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated							Grand Mean
		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	967	732	644	754	339	797	450	669	539	405	496	554	895	396	265	507
2	IET 28386	943	855	948	953	273	740	416	733	590	461	520	733	920	235	321	540
3	IET 28387	767	803	802	1182	370	549	418	699	756	612	308	951	775	514	387	615
4	IET 28390	789	827	958	1275	372	553	393	738	742	526	674	1000	747	362	274	618
5	IET 27668	800	707	747	886	354	762	545	686	838	579	473	599	947	230	400	581
6	IET 28393	936	833	796	933	523	830	238	727	833	634	574	700	759	310	213	574
7	IET 28397	722	743	923	1173	511	585	378	719	481	557	471	867	834	408	232	550
8	IET 28400	761	743	819	945	492	774	323	694	718	635	581	686	979	440	162	600
9	IET 28402	752	740	951	940	635	672	523	745	664	594	433	657	974	326	418	581
10	IET 28403	1005	701	989	1000	538	704	454	770	820	504	663	756	737	353	384	602
11	Gontra Bidhan-3	890	777	999	1073	234	782	394	736	799	600	747	595	822	351	253	595
12	IET 28407	835	670	1109	907	507	717	442	741	540	574	410	530	897	275	273	500
13	IET 28408	1007	641	683	1019	259	638	510	680	591	465	421	606	795	459	282	517
14	IET 28409	890	697	1381	1305	330	582	423	801	614	586	668	923	884	239	287	600
15	IET 28411	873	732	793	647	492	499	352	627	584	612	360	424	995	468	330	539
16	IET 28412	1040	690	871	791	367	626	468	693	690	541	678	488	661	293	428	540
17	IET 28417	692	681	664	567	198	659	387	550	479	592	464	367	895	208	298	472
18	IET 28422	751	762	973	954	468	474	296	668	552	653	460	625	1112	322	182	558
19	IET 28423	828	755	695	957	227	684	576	675	332	656	349	601	665	311	361	468
20	IET 28425	1075	710	1094	647	517	545	603	741	602	586	792	424	1008	247	398	580
21	IET 28427	831	674	991	1029	516	566	370	711	456	557	485	698	678	185	180	463
22	IET 28429	946	699	1149	994	635	554	483	780	312	552	511	609	680	217	373	465
23	IET 28432	727	710	1070	868	414	575	469	690	504	576	404	559	712	275	341	482
24	IET 27908	924	755	1209	1350	165	691	451	792	509	648	310	960	578	296	374	525
25	IET 27876	789	732	793	783	398	690	459	664	593	395	381	529	582	418	369	467
26	IET 25713	831	657	787	1042	685	612	346	709	385	557	446	683	859	296	312	505
27	IET 26468	698	581	658	746	729	552	426	627	448	480	528	490	629	380	288	463
28	IET 26780	766	745	1123	908	496	521	408	710	657	512	554	597	719	314	276	518
29	N-22	821	685	649	873	613	658	431	676	463	525	262	511	603	277	345	427
30	Vandana	769	475	646	644	563	544	402	577	385	407	244	333	498	341	337	364
	Mean	**848**	**717**	**897**	**938**	**441**	**638**	**428**	**701**	**583**	**553**	**489**	**635**	**795**	**325**	**311**	**527**
	LSD (Treatment)				ns					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				33.7**					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				37.5*					CV (%)					14.26		
	LSD (Location x Genotype)				130.5**												

Table 6.3.11 Influence of Heat Stress on Panicle number/m2 maturity in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated							Grand Mean
		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	493	363	273	200	229	205	197	280	293	341	258	195	179	162	118	221
2	IET 28386	317	440	223	242	175	162	288	264	337	396	218	267	235	87	122	237
3	IET 28387	280	363	203	308	170	137	267	247	367	341	155	250	189	80	145	218
4	IET 28390	360	363	249	325	163	163	250	268	397	330	270	267	155	112	149	240
5	IET 27668	263	418	232	283	271	196	282	278	400	407	203	258	155	129	175	247
6	IET 28393	510	440	218	183	511	189	271	332	487	429	164	192	253	120	209	265
7	IET 28397	330	440	360	267	278	206	259	306	390	352	270	267	340	146	229	285
8	IET 28400	237	418	171	283	272	156	213	250	360	407	133	242	105	96	176	217
9	IET 28402	353	396	339	383	523	172	211	340	430	374	255	383	198	120	182	277
10	IET 28403	410	407	228	267	282	172	197	280	467	407	218	258	219	122	168	266
11	Gontra Bidhan-3	340	462	202	300	132	263	218	274	360	451	206	267	232	196	163	268
12	IET 28407	503	385	293	300	275	254	243	322	427	385	258	258	272	179	175	279
13	IET 28408	397	363	233	300	156	221	229	271	420	352	245	258	193	172	154	256
14	IET 28409	347	396	234	300	177	203	300	279	373	363	215	308	216	155	188	260
15	IET 28411	393	418	229	275	428	229	265	319	403	385	188	242	250	181	136	255
16	IET 28412	403	374	209	217	126	187	266	255	407	363	173	225	209	114	132	232
17	IET 28417	340	440	199	167	153	203	171	239	417	429	172	217	157	131	146	238
18	IET 28422	293	462	287	283	217	163	235	277	413	451	215	318	275	114	174	280
19	IET 28423	317	418	154	267	114	213	258	249	263	396	115	238	209	164	150	219
20	IET 28425	307	396	258	250	340	254	285	299	340	396	206	283	201	205	241	267
21	IET 28427	413	385	237	283	196	229	262	287	363	352	267	267	202	155	225	262
22	IET 28429	293	385	234	383	391	205	279	310	270	374	176	342	237	131	236	252
23	IET 28432	237	407	215	275	155	247	274	258	370	374	164	270	198	196	243	259
24	IET 27908	323	451	205	383	175	197	298	290	263	429	167	340	264	145	264	267
25	IET 27876	377	440	283	217	438	255	181	313	483	363	221	242	244	204	178	276
26	IET 25713	363	396	204	183	327	246	202	275	310	385	206	163	182	169	170	226
27	IET 26468	283	407	168	217	458	172	192	271	353	363	139	240	141	97	160	213
28	IET 26780	287	418	225	358	364	171	199	289	423	407	206	323	182	120	188	264
29	N-22	500	407	236	333	493	188	140	328	517	407	189	315	261	137	136	280
30	Vandana	333	440	190	283	296	228	128	271	537	418	144	237	227	155	127	263
	Mean	**353**	**410**	**233**	**277**	**276**	**203**	**235**	**284**	**388**	**388**	**200**	**264**	**213**	**143**	**175**	**253**
	LSD (Treatment)					ns				LSD (Treatment x Genotype)						ns	
	LSD (Location x Treatment)					12.3**				LSD (Location x Treatment x Genotype)						ns	
	LSD (Genotype)					13.7*				CV (%)						11.92	
	LSD (Location x Genotype)					47.7**											

Table 6.3.12 Influence of Heat Stress on Grain number/panicle in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control								Grand Mean	Treated								Grand Mean
		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	182	79	108	108	145	115	209	100	131	129	88	95	66	128	145	167	54	109
2	IET 28386	154	112	191	148	174	97	166	164	151	158	78	154	98	143	243	92	58	128
3	IET 28387	207	95	127	131	143	67	142	140	132	117	77	109	60	131	224	83	69	109
4	IET 28390	102	80	147	107	134	173	167	128	130	127	70	117	60	139	149	117	70	106
5	IET 27668	131	105	118	110	152	67	200	147	129	122	81	99	94	114	211	133	85	118
6	IET 28393	103	58	119	96	141	46	192	140	112	114	57	104	77	114	119	125	110	102
7	IET 28397	118	89	153	92	127	101	208	134	128	119	55	134	61	124	147	150	113	113
8	IET 28400	219	115	153	167	141	79	158	105	142	184	76	128	118	132	283	100	85	138
9	IET 28402	108	69	108	83	126	57	175	109	104	90	54	96	63	124	168	125	87	101
10	IET 28403	133	111	197	166	131	107	175	96	139	124	91	153	112	146	263	125	78	136
11	Gontra Bidhan-3	143	121	118	172	121	114	267	108	145	157	113	101	137	157	144	200	76	136
12	IET 28407	146	77	159	140	121	100	258	128	141	154	70	136	2	135	153	183	81	114
13	IET 28408	166	123	146	153	153	82	225	119	146	201	71	121	41	153	102	175	70	117
14	IET 28409	173	95	150	170	141	59	208	182	147	165	63	129	77	140	269	158	91	137
15	IET 28411	120	83	118	121	143	161	233	139	140	101	66	95	46	125	217	183	64	112
16	IET 28412	121	103	131	122	173	115	192	141	137	132	65	118	98	165	60	117	63	102
17	IET 28417	129	69	108	109	142	91	208	80	117	118	39	87	75	147	99	133	68	96
18	IET 28422	137	102	176	107	132	129	167	128	135	105	55	155	4	122	142	117	84	98
19	IET 28423	117	114	213	181	157	87	217	142	153	237	55	169	35	126	148	167	74	126
20	IET 28425	120	113	157	112	149	113	258	155	147	144	61	84	91	133	203	208	143	133
21	IET 28427	154	80	152	121	106	130	233	139	139	124	50	124	50	102	221	158	115	118
22	IET 28429	151	175	148	246	113	114	208	151	163	202	61	120	24	99	240	133	125	126
23	IET 28432	166	98	170	142	119	68	250	152	146	138	40	135	131	90	211	200	114	133
24	IET 27908	184	126	203	197	129	61	200	170	159	168	91	145	0	95	216	150	127	124
25	IET 27876	110	61	128	65	138	43	258	90	112	104	31	111	44	115	117	208	80	101
26	IET 25713	131	78	144	102	135	82	250	100	128	130	39	119	62	109	105	175	81	103
27	IET 26468	139	80	135	120	167	77	175	98	124	192	40	122	86	125	192	100	74	116
28	IET 26780	128	99	152	145	144	106	175	106	132	160	69	128	68	117	71	125	91	103
29	N-22	118	68	149	83	135	89	192	72	113	118	31	135	66	117	127	142	62	100
30	Vandana	112	78	111	86	114	59	233	57	106	125	24	92	55	85	92	158	46	85
	Mean	**141**	**95**	**146**	**130**	**138**	**93**	**207**	**124**	**134**	**142**	**62**	**121**	**67**	**125**	**169**	**147**	**85**	**115**
	LSD (Treatment)					ns					LSD (Treatment x Genotype)						ns		
	LSD (Location x Treatment)					5.4**					LSD (Location x Treatment x Genotype)						ns		
	LSD (Genotype)					7.93**					CV (%)						11.3		
	LSD (Location x Genotype)					20.9**													

Table 6.3.13 Influence of Heat Stress on Spikelet number/panicle in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated							Grand Mean
		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	114	119	139	195	150	199	123	149	134	120	149	208	155	197	70	147
2	IET 28386	191	203	191	213	147	165	201	187	162	180	210	204	261	170	75	180
3	IET 28387	154	141	163	210	119	179	171	162	134	129	111	269	250	178	89	166
4	IET 28390	94	164	143	192	191	160	157	157	97	140	116	232	157	140	91	139
5	IET 27668	136	133	153	175	113	191	178	154	107	123	209	164	220	191	111	161
6	IET 28393	65	132	116	177	64	180	170	129	66	127	150	202	124	189	144	143
7	IET 28397	121	163	113	164	121	169	164	145	70	153	207	182	152	162	147	153
8	IET 28400	184	162	265	196	122	200	127	180	145	145	243	248	330	206	110	204
9	IET 28402	99	120	103	151	75	181	131	123	110	117	123	179	231	177	113	150
10	IET 28403	146	210	215	163	123	160	114	162	137	186	232	197	272	165	101	184
11	Gontra Bidhan-3	163	129	272	149	166	190	130	171	167	119	307	235	149	185	98	180
12	IET 28407	146	171	167	153	113	173	155	154	155	157	4	200	180	173	105	139
13	IET 28408	163	154	212	233	98	167	143	167	121	138	76	312	105	167	91	144
14	IET 28409	165	159	216	175	104	154	219	170	119	146	148	256	278	151	117	174
15	IET 28411	137	134	147	159	181	147	166	153	101	120	102	157	226	131	82	131
16	IET 28412	149	140	159	214	130	185	169	164	118	137	191	220	64	184	82	142
17	IET 28417	126	117	148	166	139	180	94	139	116	108	282	186	103	177	89	151
18	IET 28422	147	189	132	162	157	169	153	158	75	180	9	181	151	168	109	125
19	IET 28423	164	224	215	179	131	139	169	175	152	198	68	162	153	142	96	139
20	IET 28425	142	172	136	186	121	132	186	153	96	120	188	218	207	135	171	162
21	IET 28427	118	164	177	131	158	121	168	148	99	147	113	142	236	119	148	143
22	IET 28429	215	163	290	159	123	104	181	176	168	142	52	151	254	102	159	147
23	IET 28432	141	187	195	161	94	181	182	163	124	167	243	169	217	178	148	178
24	IET 27908	179	224	295	150	84	229	207	195	151	179	0	133	226	227	164	154
25	IET 27876	74	146	80	186	54	149	109	114	76	141	97	211	131	151	104	130
26	IET 25713	139	155	122	200	102	143	120	140	102	142	122	261	118	148	105	142
27	IET 26468	154	148	150	202	120	189	119	155	105	144	278	184	226	190	96	175
28	IET 26780	146	163	178	168	130	175	125	155	109	152	138	172	81	176	118	135
29	N-22	74	164	98	148	95	172	86	119	211	158	144	138	168	172	80	153
30	Vandana	117	121	107	154	99	166	67	119	74	110	148	149	124	166	60	118
	Mean	**139**	**159**	**170**	**176**	**121**	**168**	**149**	**155**	**120**	**144**	**149**	**197**	**185**	**167**	**109**	**153**
	LSD (Treatment)				ns					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				7.15**					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				10.46**					CV (%)					12.08		
	LSD (Location x Genotype)				27.69**												

Table 6.3.14 Influence of Heat Stress on Grain number/m2 in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated							Grand Mean
		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	38702	39490	19539	29233	27148	34767	19672	29793	25856	32604	17065	25133	25770	5820	6416	19809
2	IET 28386	35170	83974	24782	41967	16870	21574	47337	38811	26377	60819	21316	38083	57232	2964	7039	30547
3	IET 28387	26608	45848	19197	44075	11165	19491	37471	29122	28254	36960	9239	32533	42351	4768	9964	23438
4	IET 28390	28669	53460	26860	43383	28375	19839	32045	33233	27643	38676	16294	36983	23198	2219	10501	22216
5	IET 27668	27731	49126	25491	42783	17696	30749	41508	33584	32055	40183	19188	29600	32645	2973	14964	24515
6	IET 28393	29064	52426	21390	25700	23353	28210	37964	31158	28115	44594	12592	21758	30097	5100	23122	23626
7	IET 28397	29432	67474	30231	33833	27383	28053	34796	35886	21277	47421	16296	32967	50011	7666	26013	28807
8	IET 28400	26869	63580	25703	39867	21590	26365	22381	32336	26966	51887	15787	31767	31181	1302	14922	24830
9	IET 28402	24246	43010	23965	47983	30079	24862	22874	31003	23324	35860	15988	47650	33095	3222	15951	25013
10	IET 28403	44982	79937	34709	35133	30209	22070	18812	37979	42028	62304	24393	37817	57474	6204	13084	34758
11	Gontra Bidhan-3	40982	54813	31705	36333	15018	40334	23634	34688	40909	45507	28175	41950	33304	8768	12420	30148
12	IET 28407	38966	61050	32425	36133	27408	35960	31197	37591	28764	52613	486	34750	41843	14112	14296	26695
13	IET 28408	48117	53042	30692	45867	12776	29747	27172	35345	26851	42504	10154	39700	19557	17183	10760	23816
14	IET 28409	32766	59224	36791	42267	10315	23440	54490	37042	24595	46629	16525	43142	58089	13074	17061	31302
15	IET 28411	31818	49302	26370	39225	69120	24542	37015	39627	26789	36729	8696	30208	53876	18669	8964	26276
16	IET 28412	41153	48741	23343	37350	14709	28394	37406	33014	26765	42933	16903	36917	12489	6265	8431	21529
17	IET 28417	23423	47344	21714	23600	13927	30433	13818	24894	16074	37389	12735	31500	15528	3248	9998	18067
18	IET 28422	29732	81213	25305	37617	27861	22390	30236	36336	22959	70092	906	38747	39063	5185	14740	27385
19	IET 28423	36116	89001	25029	41783	10124	22255	36719	37290	14084	67122	4014	29990	30847	5802	11164	23289
20	IET 28425	33533	62095	24636	37233	38270	24018	44232	37717	20528	33165	18675	38000	40783	4965	34196	27187
21	IET 28427	32336	58575	29145	30167	25507	20051	36509	33184	18226	43439	13398	26967	44802	5216	25913	25423
22	IET 28429	51429	56925	36280	43517	44342	13518	42395	41201	14750	44858	4264	33933	56519	4824	29540	26955
23	IET 28432	23140	68849	29057	32717	10282	37033	41741	34688	14976	50677	21512	24493	42045	18219	27810	28533
24	IET 27908	40674	91630	40224	49417	10180	40840	50675	46234	23906	62392	0	32270	57243	11424	33509	31535
25	IET 27876	22751	56001	17983	29967	18693	29262	16408	27295	15149	40370	9714	27862	28630	12347	14307	21197
26	IET 25713	28005	57167	20968	24800	26877	25906	20773	29214	12159	45837	12875	17813	19375	7422	13883	18481
27	IET 26468	22330	54912	18313	36483	35728	27166	18929	30552	14327	44253	11993	29903	26939	2353	11919	20241
28	IET 26780	28512	63426	23071	51500	38399	23843	23123	35982	29135	52140	13926	37667	12832	3779	17837	23902
29	N-22	33197	60764	18768	44800	43765	26702	10288	34041	16182	55011	12561	36758	33428	3692	8556	23741
30	Vandana	26186	48928	13082	32467	17114	30278	7344	25057	12371	38654	7962	20127	21008	12446	5970	16934
	Mean	**32555**	**60044**	**25892**	**37907**	**24809**	**27070**	**30632**	**34130**	**23380**	**46787**	**13121**	**32900**	**35709**	**7374**	**15775**	**25007**
	LSD (Treatment)				ns					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				1845**					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				2702**					CV (%)					16.22		
	LSD (Location x Genotype)				7149**												

Table 6.3.15 Influence of Heat Stress on Spikelet number/m2 in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated							Grand Mean
		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	56202	43263	47875	39200	34491	34377	24288	39956	38522	40865	38397	40708	27543	5437	8317	28541
2	IET 28386	60162	89232	55734	51283	25097	21252	57959	51531	54762	70961	45830	54433	61381	2633	9125	42732
3	IET 28387	43069	51029	33568	65442	19627	19143	45828	39672	49240	43714	17092	67433	47686	4419	12916	34643
4	IET 28390	33711	59587	51298	62233	31283	19527	39297	42420	38607	46409	31448	61783	24598	1948	13613	31201
5	IET 27668	35508	55550	41327	49267	30307	30375	50126	41780	42306	50237	42405	42400	33958	2600	19397	33329
6	IET 28393	32685	57992	25410	31800	32585	27857	46062	36342	32085	54461	24555	38633	31362	4733	30137	30852
7	IET 28397	39740	71863	40738	43550	33580	27721	42510	42815	27267	54153	55840	48567	51583	7351	33721	39783
8	IET 28400	43090	67650	47135	54950	33187	25969	27173	42736	52192	58718	32363	59958	34846	898	19343	36903
9	IET 28402	35015	47696	34939	57833	39117	24508	27553	38095	47271	43725	31337	68483	45666	2878	20677	37148
10	IET 28403	59354	85382	62564	43667	34726	21756	22454	47129	63667	75603	50738	50992	59662	5880	16961	46215
11	Gontra Bidhan-3	55061	59730	74700	45217	21772	39960	28352	46399	60158	53504	63394	62783	34535	8405	16100	42697
12	IET 28407	73930	65813	57178	45567	30978	35623	37691	49540	65283	60478	1044	51492	49581	13775	18532	37169
13	IET 28408	64262	56177	69455	68867	15272	29420	32782	48034	47508	48554	18785	80833	20332	16857	13948	35260
14	IET 28409	57319	62810	61939	53350	17500	23143	65509	48796	45369	52756	31893	78942	59807	12779	22116	43380
15	IET 28411	53052	55704	36803	43575	77764	24258	44090	47892	40858	46288	19218	37900	56279	18411	11620	32939
16	IET 28412	59560	52261	36734	46117	16265	28032	45057	40575	47780	49995	32961	49333	13239	5902	10929	30020
17	IET 28417	43108	51612	35759	27567	21026	30083	16293	32207	48257	46211	51213	39717	16069	2899	12960	31047
18	IET 28422	43604	87208	37771	46200	33928	22060	36052	43832	31047	81411	1857	57745	41669	4855	19108	33956
19	IET 28423	52250	93874	33079	47833	14963	21985	43691	43954	38959	78650	7867	38642	31785	5525	14472	30843
20	IET 28425	42236	67815	37320	47067	40837	23762	52926	44566	32583	47795	38844	61917	41627	4702	40994	38352
21	IET 28427	48956	63349	62819	37250	30995	19816	43890	43868	35961	51524	30145	37633	47776	4984	33356	34483
22	IET 28429	63278	62700	68164	60583	47858	13316	50452	52336	41465	53185	9167	51558	59671	4626	37397	36724
23	IET 28432	32768	75878	42632	44458	13440	36677	49782	42234	45547	62370	39797	45667	43268	17871	36049	41510
24	IET 27908	58144	100760	65454	57567	13600	40387	61821	56819	39641	76747	0	45073	59994	10980	43438	39410
25	IET 27876	27586	63866	23681	40700	23200	28971	19764	32538	37036	51216	21467	51152	32076	12053	18546	31935
26	IET 25713	49770	61787	33533	36117	33410	25627	24847	37870	31602	54791	25106	42580	21517	7138	17997	28676
27	IET 26468	42051	60324	27975	43883	54673	26794	22926	39804	37270	52338	38798	44143	32049	1980	15450	31718
28	IET 26780	41772	68024	48781	60475	47143	23500	27186	45269	45926	62018	28549	55420	14786	3438	23122	33323
29	N-22	36448	66748	27997	49133	46590	26365	12158	37920	106537	64229	30988	43373	43849	3358	11091	43347
30	Vandana	38648	53207	33129	43800	28717	29956	8655	33730	39227	45826	34449	35323	28450	12121	7738	29019
	Mean	**47411**	**65296**	**45183**	**48152**	**31464**	**26741**	**36906**	**43022**	**45464**	**55958**	**29852**	**51487**	**38888**	**7048**	**20306**	**35572**
	LSD (Treatment)					ns				LSD (Treatment x Genotype)						ns	
	LSD (Location x Treatment)					3088**				LSD (Location x Treatment x Genotype)						ns	
	LSD (Genotype)					3437*				CV (%)						20.42	
	LSD (Location x Genotype)					11962**											

Table 6.3.16 Influence of Heat Stress on Total dry matter (g/m2) in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated							Grand Mean
		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	1591	1004	1311	2167	3179	1731	845	1690	1065	956	1097	1926	2026	1189	941	1314
2	IET 28386	1417	1195	1599	2646	1050	1633	1365	1558	991	1056	1105	2406	2300	906	815	1368
3	IET 28387	1196	1122	1345	2647	2593	1305	1155	1623	1188	1012	795	2413	2177	1059	816	1351
4	IET 28390	1404	835	1771	3462	1882	1157	1080	1656	1423	722	1405	3034	2697	963	950	1599
5	IET 27668	1336	1034	1472	2252	2134	1436	1138	1543	1444	942	1125	1692	2853	832	833	1389
6	IET 28393	1555	735	1597	2685	2709	1670	1205	1736	1380	620	1293	2174	2788	840	1071	1452
7	IET 28397	1438	1059	1823	3161	1820	1479	1102	1697	1120	1005	1280	2729	2730	1085	1194	1592
8	IET 28400	1262	1229	1434	1998	1390	1470	839	1375	1351	1073	1134	1633	2970	939	869	1424
9	IET 28402	1222	1011	1769	2578	1375	1598	869	1489	1210	959	1168	2206	2517	1000	943	1429
10	IET 28403	1631	904	1710	2547	1797	1359	869	1545	1458	846	1312	2006	1988	927	1087	1375
11	Gontra Bidhan-3	1482	780	1637	2316	871	1486	1167	1391	1359	645	1322	1811	2832	912	1088	1424
12	IET 28407	1451	870	1682	2319	1187	1234	1117	1408	1026	842	926	1872	2038	756	1049	1216
13	IET 28408	1588	866	1437	2402	894	1287	908	1340	999	853	1101	1739	1909	1075	882	1223
14	IET 28409	1465	995	2188	3331	1200	1093	1285	1651	1175	775	1395	2721	2975	898	1115	1579
15	IET 28411	1422	768	1487	1840	2027	1169	1077	1398	1172	734	985	1437	3696	959	953	1420
16	IET 28412	1686	1001	1394	2128	890	1282	1163	1363	1228	964	1150	1647	2709	874	937	1358
17	IET 28417	1218	810	1155	1754	676	1154	805	1082	1119	774	907	1376	2825	775	847	1232
18	IET 28422	1420	943	1842	1906	1829	1291	1183	1488	1213	876	1243	1515	3534	909	1061	1479
19	IET 28423	1542	793	1499	2776	1139	1420	1096	1466	940	716	1071	2163	3814	917	901	1503
20	IET 28425	1708	821	1826	1980	1373	1320	1185	1459	1211	740	1452	1465	2855	874	1245	1406
21	IET 28427	1492	884	1623	2595	2665	1522	1119	1700	983	840	1055	2017	2795	881	1090	1380
22	IET 28429	1625	951	2330	2922	1968	1156	1153	1729	850	763	1576	2123	2438	741	1116	1372
23	IET 28432	1456	1046	1920	2601	1872	1304	1220	1631	1271	983	1170	2019	3073	921	1134	1510
24	IET 27908	1706	951	2110	3616	1072	1476	1269	1743	1181	763	1122	2999	2803	896	1269	1576
25	IET 27876	1320	807	1382	2068	1610	1259	808	1322	1166	761	912	1721	2010	1084	994	1236
26	IET 25713	1389	1023	1330	3009	1093	1315	1021	1454	857	934	935	2381	2608	1005	983	1386
27	IET 26468	1181	757	1275	2195	2141	1112	901	1366	1095	558	1083	1769	2595	972	697	1253
28	IET 26780	1222	841	1736	2592	1178	1105	1003	1382	1207	757	1107	1974	2537	1083	1028	1385
29	N-22	1404	947	1108	2365	2007	1383	782	1428	908	784	675	1666	3026	964	702	1246
30	Vandana	1295	1044	1065	1422	756	1137	709	1061	1153	957	622	1012	1771	886	605	1001
	Mean	**1437**	**934**	**1595**	**2476**	**1613**	**1345**	**1048**	**1493**	**1158**	**840**	**1117**	**1988**	**2663**	**937**	**974**	**1383**
	LSD (Treatment)					ns				LSD (Treatment x Genotype)						ns	
	LSD (Location x Treatment)					47.9**				LSD (Location x Treatment x Genotype)						ns	
	LSD (Genotype)					70.1**				CV (%)						8.65	
	LSD (Location x Genotype)					185.54**											

Table 6.3.17 Influence of Heat Stress on Grain yield (g/m2) in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control								Grand Mean	Treated								Grand Mean
		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	929	805	501	238	604	159	718	333	536	659	455	467	303	404	148	312	189	367
2	IET 28386	800	751	621	477	803	469	672	560	644	653	454	507	351	583	78	192	203	378
3	IET 28387	900	641	564	407	1032	715	521	463	655	731	586	493	182	801	75	465	241	447
4	IET 28390	832	706	421	667	1125	586	361	424	640	749	650	348	310	850	165	286	246	450
5	IET 27668	830	718	519	607	736	518	573	480	623	622	760	433	338	449	200	142	299	406
6	IET 28393	914	853	367	601	783	533	631	459	643	909	759	279	251	550	243	275	355	453
7	IET 28397	913	634	543	693	1023	510	393	442	644	698	422	495	245	717	478	242	397	462
8	IET 28400	654	627	639	540	795	713	705	344	627	418	575	530	280	536	452	367	296	432
9	IET 28402	699	639	515	592	790	641	565	353	599	459	532	470	276	507	370	251	304	396
10	IET 28403	983	895	463	620	850	403	561	308	635	733	716	412	382	606	405	252	272	472
11	Gontra Bidhan-3	1048	780	398	601	923	540	593	351	654	763	706	326	404	445	438	252	265	450
12	IET 28407	658	663	440	524	757	387	540	418	548	542	382	415	7	380	186	177	284	297
13	IET 28408	780	852	444	519	869	432	577	387	607	638	460	413	146	456	394	408	245	395
14	IET 28409	819	680	526	829	1155	577	472	590	706	687	470	341	332	773	234	171	317	416
15	IET 28411	764	705	383	606	497	729	449	450	573	586	501	359	147	274	130	408	223	329
16	IET 28412	722	892	515	502	641	857	488	458	634	494	567	482	283	338	549	244	222	397
17	IET 28417	666	536	415	469	451	568	395	255	469	473	335	380	223	217	143	156	239	271
18	IET 28422	776	679	474	582	804	474	393	414	575	731	484	436	14	475	187	226	295	356
19	IET 28423	698	714	398	472	807	880	493	457	615	710	246	346	67	451	379	278	260	342
20	IET 28425	752	950	408	698	540	536	381	502	596	763	491	368	439	274	59	163	444	375
21	IET 28427	800	730	439	642	879	639	372	453	619	738	352	408	215	548	413	135	372	398
22	IET 28429	657	844	447	539	844	556	405	488	597	577	206	370	79	459	335	185	415	328
23	IET 28432	751	626	535	755	718	432	362	491	584	677	352	487	406	409	580	245	400	444
24	IET 27908	793	797	447	822	1200	511	459	560	699	684	422	370	0	810	160	250	444	392
25	IET 27876	823	724	422	536	633	419	457	294	539	526	465	373	213	379	124	242	282	325
26	IET 25713	759	687	526	534	892	429	347	324	562	691	274	470	234	533	261	267	284	377
27	IET 26468	758	543	380	452	596	787	374	321	526	641	321	270	221	340	378	352	260	348
28	IET 26780	818	640	426	489	758	432	402	338	538	703	551	363	233	447	615	232	319	433
29	N-22	482	756	481	416	723	183	518	231	474	441	359	381	231	361	351	175	217	315
30	Vandana	668	664	526	344	345	391	356	182	435	519	244	464	172	183	452	258	163	307
	Mean	**782**	**724**	**473**	**559**	**786**	**534**	**484**	**404**	**593**	**641**	**470**	**409**	**233**	**485**	**299**	**254**	**292**	**385**
	LSD (Treatment)				8.51*						LSD (Treatment x Genotype)					NS			
	LSD (Location x Treatment)				31.6**						LSD (Location x Treatment x Genotype)					NS			
	LSD (Genotype)				43.3**						CV (%)					16.8			
	LSD (Location x Genotype)				122.6**														

Table 6.3.18 Influence of Heat Stress on 1000 grain weight (g) in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	Grand Mean	CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	Grand Mean
1	IET 28384	22.5	20.7	21.8	18.7	24.5	20.0	30.3	23.3	22.7	21.0	17.6	17.2	17.8	22.0	17.0	24.9	23.0	20.1
2	IET 28386	23.7	21.4	21.5	19.8	24.8	17.7	28.1	20.7	22.2	19.5	17.2	18.3	16.5	23.4	19.0	23.6	14.7	19.0
3	IET 28387	26.6	24.1	22.5	21.5	24.7	20.7	30.1	21.8	24.0	26.5	20.7	19.0	19.7	17.6	23.7	28.5	19.7	21.9
4	IET 28390	28.3	24.6	21.0	24.9	32.5	22.7	27.4	24.5	25.7	27.1	23.5	17.0	19.0	23.4	21.0	26.0	21.7	22.3
5	IET 27668	28.2	25.9	22.7	23.8	30.3	19.3	27.2	23.7	25.2	26.3	23.7	19.5	17.6	25.7	21.3	18.9	18.7	21.5
6	IET 28393	32.6	29.4	21.8	28.0	29.6	17.7	27.0	23.3	26.2	32.9	27.0	19.7	20.0	28.2	22.0	24.4	21.0	24.4
7	IET 28397	21.8	21.7	22.1	22.7	19.9	20.7	32.1	24.8	23.2	22.5	19.8	17.8	15.3	24.6	20.0	30.0	23.0	21.6
8	IET 28400	24.5	23.4	21.1	21.1	21.8	22.0	28.7	24.5	23.4	21.3	21.5	18.6	17.9	24.3	19.3	21.2	22.0	20.8
9	IET 28402	23.9	26.4	23.5	24.6	28.8	23.3	26.5	22.7	25.0	27.5	22.5	17.5	16.9	24.3	20.0	24.5	20.7	21.7
10	IET 28403	23.9	19.9	17.4	17.9	19.8	18.0	30.5	18.7	20.7	18.5	17.0	14.5	15.7	20.3	17.3	29.2	15.3	18.5
11	Gontra Bidhan-3	25.9	19.0	19.5	18.9	29.6	16.7	22.1	19.7	21.4	22.5	17.2	17.5	14.3	19.5	17.3	20.4	17.3	18.3
12	IET 28407	19.1	17.0	15.1	16.2	20.0	18.7	21.3	18.0	18.2	14.7	13.3	12.6	14.6	24.0	16.0	18.7	13.3	15.9
13	IET 28408	19.1	17.7	17.0	16.9	20.5	17.7	27.7	19.2	19.5	19.3	17.1	14.3	14.4	19.5	31.3	22.7	15.3	19.2
14	IET 28409	23.3	20.8	24.0	22.6	25.7	19.3	31.7	23.7	23.9	19.8	19.3	19.2	20.3	24.8	19.7	28.5	24.0	21.9
15	IET 28411	26.4	22.1	25.0	23.0	22.1	23.7	25.7	23.8	24.0	22.4	18.7	19.5	16.9	25.0	16.0	24.1	21.0	20.5
16	IET 28412	22.6	21.7	20.6	21.5	28.7	21.0	25.3	21.7	22.9	23.7	21.2	19.5	16.6	30.3	19.0	23.7	19.0	21.6
17	IET 28417	22.7	23.0	23.1	21.7	22.3	22.0	28.0	22.7	23.2	21.1	20.9	18.2	17.5	30.4	21.0	25.4	21.0	21.9
18	IET 28422	35.5	22.8	23.1	23.1	22.6	24.0	32.0	24.5	26.0	22.9	21.0	19.2	15.3	29.5	19.0	30.6	22.0	22.4
19	IET 28423	22.6	19.8	19.3	18.9	24.8	15.0	22.3	26.3	21.1	23.1	17.4	18.9	16.7	32.0	20.7	19.7	24.0	21.6
20	IET 28425	32.7	28.4	22.1	28.4	28.8	23.0	24.5	30.3	27.3	28.2	23.9	19.4	23.5	32.0	24.7	23.3	32.0	25.9
21	IET 28427	25.5	22.6	23.2	22.2	27.7	19.7	26.3	27.3	24.3	25.2	19.2	20.2	16.1	24.7	20.0	19.6	23.0	21.0
22	IET 28429	31.6	16.4	15.3	14.9	20.2	14.7	24.6	19.7	19.7	21.4	14.0	13.3	18.5	29.5	13.0	19.5	15.0	18.0
23	IET 28432	21.1	27.0	24.5	25.9	20.6	18.0	26.3	24.3	23.5	29.4	23.2	19.8	19.0	19.5	20.0	25.6	27.0	23.0
24	IET 27908	27.6	19.6	16.7	20.5	20.0	20.7	30.0	23.7	22.3	20.8	17.6	13.4	18.5	20.9	18.0	29.2	21.0	19.9
25	IET 27876	34.7	31.8	20.4	30.1	20.1	30.0	28.4	27.5	27.9	32.9	30.7	17.5	21.9	33.0	23.0	26.2	26.0	26.4
26	IET 25713	25.5	24.5	22.0	25.8	20.0	20.0	26.7	30.8	24.4	25.0	22.5	19.2	18.4	24.2	27.3	24.1	26.0	23.3
27	IET 26468	33.1	24.2	21.1	24.8	26.1	23.7	23.9	28.3	25.6	27.3	22.1	18.6	18.5	32.8	21.0	21.4	22.0	23.0
28	IET 26780	25.7	22.5	22.4	20.9	27.5	19.3	25.0	24.7	23.5	19.7	19.0	19.0	16.8	28.4	21.3	21.7	18.0	20.5
29	N-22	28.8	22.8	23.9	22.9	29.2	21.0	26.5	21.8	24.6	23.1	22.3	19.6	18.3	26.0	20.0	22.3	20.0	21.5
30	Vandana	25.7	25.4	22.1	26.7	24.6	19.7	20.7	24.7	23.7	24.8	22.1	18.0	21.8	27.3	29.3	18.8	22.0	23.0
	Mean	26.2	22.9	21.2	22.3	24.6	20.3	26.9	23.7	23.5	23.7	20.5	17.9	17.8	25.6	20.6	23.9	21.0	21.4
	LSD (Treatment)					0.173*					LSD (Treatment x Genotype)						ns		
	LSD (Location x Treatment)					0.642**					LSD (Location x Treatment x Genotype)						ns		
	LSD (Genotype)					0.879**					CV (%)						7.4		
	LSD (Location x Genotype)					2.487**													

Table 6.3.19 Influence of Heat Stress on Harvest Index (%) at different AICRIP locations Kharif 2019

S.No.	Genotypes	Control								Grand Mean	Treated								Grand Mean
		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB		CHN	IIRR	MTU	NRRI	PNR	PTB	REWA	TTB	
1	IET 28384	51.7	50.4	50.0	0.3	27.9	2.5	41.4	39.5	33.0	43.3	42.2	48.8	0.3	21.0	23.4	26.2	20.1	28.2
2	IET 28386	59.4	52.9	52.1	0.3	30.4	7.2	41.3	41.0	35.6	53.5	45.4	48.0	0.3	24.3	31.1	21.1	24.9	31.1
3	IET 28387	54.7	53.6	50.2	0.3	38.9	6.4	40.1	40.1	35.5	47.6	49.2	48.7	0.2	33.3	26.8	44.3	29.5	34.9
4	IET 28390	51.2	50.2	50.4	0.4	32.5	10.9	31.1	39.3	33.2	49.0	45.8	48.2	0.2	28.1	19.2	29.7	25.9	30.8
5	IET 27668	56.6	53.6	50.2	0.4	32.7	11.5	39.9	42.2	35.9	47.1	52.6	46.0	0.3	26.6	19.3	17.0	36.0	30.6
6	IET 28393	56.6	54.9	50.0	0.4	29.2	17.6	37.8	38.1	35.6	57.5	54.8	45.0	0.2	25.3	18.1	32.8	33.0	33.3
7	IET 28397	50.9	43.8	51.3	0.4	32.3	24.8	26.7	40.1	33.8	46.1	37.6	49.2	0.2	26.3	27.5	22.2	33.3	30.3
8	IET 28400	49.3	49.8	52.0	0.4	39.8	26.8	47.9	40.9	38.4	39.8	42.5	49.4	0.2	32.9	21.6	39.1	34.1	32.4
9	IET 28402	53.2	52.2	50.9	0.3	30.6	29.7	35.4	40.6	36.6	46.2	43.0	49.0	0.2	23.0	16.2	25.1	32.1	29.3
10	IET 28403	59.2	54.9	51.2	0.4	33.4	24.3	41.4	35.6	37.5	55.8	49.0	48.7	0.3	30.2	27.3	27.1	25.6	33.0
11	Gontra Bidhan-3	64.0	52.6	51.0	0.4	40.0	22.6	39.8	30.1	37.6	62.0	51.4	50.6	0.3	24.7	13.7	27.9	24.6	31.9
12	IET 28407	45.3	45.5	50.6	0.3	32.6	33.1	43.9	37.5	36.1	42.3	37.8	49.3	0.0	20.2	21.7	23.4	27.1	27.7
13	IET 28408	52.8	53.7	51.3	0.4	36.1	27.0	44.8	42.6	38.6	47.9	45.1	48.4	0.1	26.2	30.1	38.1	27.8	33.0
14	IET 28409	52.1	46.5	52.8	0.4	34.7	11.6	43.1	46.0	35.9	47.9	37.6	44.0	0.2	28.4	24.5	19.2	28.5	28.8
15	IET 28411	55.7	49.6	50.0	0.4	26.9	27.3	38.4	41.8	36.3	51.4	42.6	49.0	0.1	19.1	23.2	42.6	23.4	31.4
16	IET 28412	59.0	52.9	51.4	0.4	30.1	16.3	38.1	39.3	36.0	50.0	46.0	50.0	0.2	20.6	21.0	28.1	23.6	29.9
17	IET 28417	53.2	44.4	51.3	0.4	25.6	29.8	34.3	31.7	33.8	47.2	30.1	49.2	0.2	15.9	16.8	20.2	28.2	26.0
18	IET 28422	45.9	47.9	50.3	0.3	42.0	20.7	30.6	35.0	34.1	41.9	39.8	49.7	0.0	31.3	24.9	24.8	27.9	30.1
19	IET 28423	41.3	46.3	50.2	0.3	29.1	5.4	34.7	41.7	31.1	42.9	26.0	48.3	0.1	20.9	14.0	30.3	28.8	26.4
20	IET 28425	57.4	55.7	49.7	0.4	27.4	30.3	28.9	42.5	36.5	56.4	40.6	49.8	0.3	18.8	22.4	18.7	35.6	30.3
21	IET 28427	55.0	48.7	49.7	0.4	33.8	12.6	24.5	40.5	33.1	54.0	35.5	48.5	0.2	27.2	19.6	15.3	34.0	29.3
22	IET 28429	51.2	51.9	47.2	0.2	28.9	29.5	35.1	42.3	35.8	49.5	24.3	48.5	0.1	21.6	17.7	25.1	37.2	28.0
23	IET 28432	58.8	43.0	51.2	0.4	27.6	8.6	27.8	40.2	32.2	55.0	26.7	49.5	0.3	20.2	16.6	26.6	35.3	28.8
24	IET 27908	51.1	46.6	47.2	0.4	33.2	11.6	31.1	44.1	33.1	50.0	35.4	48.5	0.0	27.0	14.0	28.0	35.0	29.7
25	IET 27876	52.5	54.7	52.4	0.4	30.6	15.8	36.3	36.4	34.9	47.5	39.8	49.0	0.2	22.1	21.8	22.4	28.3	28.9
26	IET 25713	53.7	49.3	51.4	0.4	29.6	35.7	26.4	31.7	34.8	53.0	31.9	50.3	0.3	22.4	30.4	26.5	28.9	30.5
27	IET 26468	53.9	45.7	50.3	0.4	27.2	28.7	33.6	35.8	34.4	45.8	28.3	48.4	0.2	19.3	16.7	36.2	37.3	29.0
28	IET 26780	57.9	52.5	50.6	0.3	29.2	33.0	36.4	33.6	36.7	55.5	45.7	48.0	0.2	22.6	7.2	21.5	31.1	29.0
29	N-22	53.3	53.9	50.8	0.4	30.5	22.6	37.5	29.6	34.8	49.2	39.4	48.6	0.3	21.7	12.9	18.4	30.8	27.7
30	Vandana	50.6	51.0	50.3	0.3	24.2	22.3	31.3	25.6	32.0	49.8	18.7	48.5	0.3	18.0	11.3	29.3	26.8	25.3
	Mean	**53.6**	**50.3**	**50.6**	**0.4**	**31.6**	**20.2**	**36.0**	**38.2**	**35.1**	**49.5**	**39.5**	**48.6**	**0.2**	**24.0**	**20.4**	**26.9**	**29.8**	**29.9**
	LSD (Treatment)					0.508*					LSD (Treatment x Genotype)						ns		
	LSD (Location x Treatment)					1.432**					LSD (Location x Treatment x Genotype)						ns		
	LSD (Genotype)					1.493*					CV (%)						11		
	LSD (Location x Genotype)					5.55**													

Table 6.3.20 Heat tolerance indices of different rice genotypes. The indices are computed based on grain obtained under control (Yp) and elevated temperature conditions. Each value represents the mean of 8 locations during Kharif-2019

S.No.	Genotypes	Yp	Ys	HSI	RHI	HTI	GMP	TOL	MPI	SSI	YSI	HI	STI	HM	K1STI	K2STI	Rank Sum	Mean Rank	Sem
1	IET 28384	535.7	367.0	0.898	1.055	0.685	443	169	451	0.953	0.685	0.653	0.557	436	0.813	0.909	195	14.7	1.7
2	IET 28386	644.1	377.5	1.174	0.905	0.586	493	267	511	0.981	0.586	0.575	0.689	476	1.176	0.962	173	13.4	1.6
3	IET 28387	655.3	446.5	0.904	1.943	0.681	541	209	551	1.160	0.681	0.790	0.829	531	1.217	1.345	265	20.0	2.0
4	IET 28390	640.3	450.4	0.842	2.005	0.703	537	190	545	1.170	0.703	0.823	0.817	529	1.162	1.368	271	20.5	2.0
5	IET 27668	622.7	405.5	0.990	1.857	0.651	503	217	514	1.053	0.651	0.686	0.716	491	1.099	1.109	222	17.1	1.2
6	IET 28393	642.8	452.5	0.840	1.087	0.704	539	190	548	1.175	0.704	0.827	0.824	531	1.171	1.381	271	20.6	2.0
7	IET 28397	643.9	461.6	0.804	1.107	0.717	545	182	553	1.199	0.717	0.859	0.842	538	1.175	1.437	293	22.3	2.4
8	IET 28400	627.1	431.6	0.885	1.063	0.688	520	196	529	1.121	0.688	0.772	0.767	511	1.115	1.257	256	19.7	1.3
9	IET 28402	599.2	396.1	0.962	1.021	0.661	487	203	498	1.029	0.661	0.680	0.673	477	1.018	1.059	203	15.7	0.5
10	IET 28403	635.5	472.2	0.729	1.147	0.743	548	163	554	1.226	0.743	0.911	0.850	542	1.145	1.504	296	22.4	2.7
11	Gontra Bidhan-3	654.0	449.9	0.886	1.062	0.688	542	204	552	1.169	0.688	0.804	0.834	533	1.212	1.366	269	20.6	1.9
12	IET 28407	548.2	296.6	1.302	0.836	0.541	403	252	422	0.770	0.541	0.417	0.461	385	0.852	0.594	92	6.7	2.6
13	IET 28408	607.4	395.0	0.992	1.004	0.650	490	212	501	1.026	0.650	0.667	0.680	479	1.046	1.053	193	14.9	0.3
14	IET 28409	706.0	415.6	1.167	0.909	0.589	542	290	561	1.080	0.589	0.636	0.832	523	1.413	1.166	210	16.2	2.4
15	IET 28411	572.8	328.5	1.210	0.886	0.574	434	244	451	0.853	0.574	0.489	0.533	418	0.930	0.728	122	9.2	1.9
16	IET 28412	634.4	397.4	1.060	0.967	0.626	502	237	516	1.032	0.626	0.647	0.715	489	1.141	1.065	197	15.4	1.2
17	IET 28417	469.4	270.9	1.200	0.891	0.577	357	199	370	0.704	0.577	0.406	0.360	344	0.624	0.495	109	7.9	2.8
18	IET 28422	574.5	355.9	1.080	0.957	0.620	452	219	465	0.924	0.620	0.573	0.580	440	0.935	0.855	154	11.7	1.1
19	IET 28423	614.8	342.1	1.259	0.859	0.556	459	273	478	0.888	0.556	0.494	0.596	440	1.071	0.789	131	9.9	2.0
20	IET 28425	595.9	375.2	1.051	0.972	0.630	473	221	486	0.975	0.630	0.614	0.634	460	1.007	0.950	172	13.1	0.7
21	IET 28427	619.2	397.7	1.015	0.992	0.642	496	221	508	1.033	0.642	0.663	0.698	484	1.086	1.067	195	15.3	0.9
22	IET 28429	597.4	328.2	1.279	0.848	0.549	443	269	463	0.853	0.549	0.468	0.556	424	1.011	0.727	116	8.7	2.2
23	IET 28432	583.7	444.4	0.677	1.176	0.761	509	139	514	1.154	0.761	0.879	0.735	505	0.966	1.332	256	18.8	2.6
24	IET 27908	698.7	392.5	1.244	0.867	0.562	524	306	546	1.019	0.562	0.573	0.777	503	1.384	1.039	182	14.1	2.5
25	IET 27876	538.6	325.4	1.124	0.933	0.604	419	213	432	0.845	0.604	0.510	0.497	406	0.822	0.714	132	9.8	1.9
26	IET 25713	562.2	376.8	0.936	1.035	0.670	460	185	470	0.979	0.670	0.656	0.600	451	0.896	0.958	199	15.1	1.0
27	IET 26468	526.3	347.7	0.963	1.020	0.661	428	179	437	0.903	0.661	0.597	0.519	419	0.785	0.816	169	12.7	1.7
28	IET 26780	537.8	432.9	0.553	1.243	0.805	483	105	485	1.124	0.805	0.905	0.660	480	0.820	1.264	240	17.9	2.7
29	N-22	473.7	314.6	0.953	1.025	0.664	386	159	394	0.817	0.664	0.543	0.422	378	0.636	0.668	169	12.4	2.6
30	Vandana	434.5	306.9	0.833	1.091	0.706	365	128	371	0.797	0.706	0.563	0.378	360	0.535	0.636	194	14.1	3.3
	Mean	**593.2**	**385.2**	**0.994**	**1.092**	**0.650**	**477**	**208**	**489**	**1.000**	**0.650**	**0.656**	**0.654**	**466**	**1.009**	**1.020**	**198**	**15.0**	**1.9**

HIS = Heat Stress Index; RHI = Relative Heat Stress Index; GMP= Geometric Mean of Productivity; TOL = Tolerance; SSI= Stress Susceptibility Index; YSI= Yield Stability Index; STI= Stress Tolerance Index; MPI = Mean Productivity Index

Table 6.3.21 Correlation between Heat Tolerance Indices and mean grain yield recorded under control (Yp) and elevated temperature (Ys) conditions

	Yp	Ys	HSI	RHI	HTI	GMP	TOL	MPI	SSI	YSI	HI	STI	HM	K1STI	K2STI
Yp	**1.00**	0.70	0.08	0.19	-0.08	0.90	0.56	0.94	0.70	-0.08	0.41	0.89	0.86	1.00	0.69
Ys	**0.70**	**1.00**	-0.65	0.49	0.65	0.94	-0.20	0.91	1.00	0.65	0.94	0.95	0.97	0.70	1.00
HSI	0.08	**-0.65**	**1.00**	-0.47	-1.00	-0.36	0.87	-0.27	-0.65	-1.00	-0.87	-0.37	-0.43	0.09	-0.66
RHI	0.19	**0.49**	-0.47	**1.00**	0.47	0.39	-0.31	0.36	0.49	0.47	0.53	0.40	0.42	0.19	0.50
HTI	-0.08	**0.65**	-1.00	0.47	**1.00**	0.36	-0.87	0.27	0.65	1.00	0.87	0.37	0.43	-0.09	0.66
GMP	**0.90**	**0.94**	-0.36	0.39	0.36	**1.00**	0.14	1.00	0.94	0.36	0.76	1.00	1.00	0.89	0.93
TOL	**0.56**	-0.20	0.87	-0.31	-0.87	0.14	**1.00**	0.23	-0.20	-0.87	-0.53	0.13	0.06	0.56	-0.22
MPI	0.94	**0.91**	-0.27	0.36	0.27	1.00	0.23	**1.00**	0.91	0.27	0.70	0.99	0.98	0.93	0.90
SSI	**0.70**	**1.00**	-0.65	0.49	0.65	0.94	-0.20	0.91	**1.00**	0.65	0.94	0.95	0.97	0.70	1.00
YSI	-0.08	**0.65**	-1.00	0.47	1.00	0.36	-0.87	0.27	0.65	**1.00**	0.87	0.37	0.43	-0.09	0.66
HI	**0.41**	**0.94**	-0.87	0.53	0.87	0.76	-0.53	0.70	0.94	0.87	**1.00**	0.77	0.81	0.40	0.94
STI	**0.89**	**0.95**	-0.37	0.40	0.37	1.00	0.13	0.99	0.95	0.37	0.77	**1.00**	1.00	0.89	0.94
HM	**0.86**	**0.97**	-0.43	0.42	0.43	1.00	0.06	0.98	0.97	0.43	0.81	1.00	**1.00**	0.86	0.96
K1STI	**1.00**	**0.70**	0.09	0.19	-0.09	0.89	0.56	0.93	0.70	-0.09	0.40	0.89	0.86	**1.00**	0.68
K2STI	**0.69**	**1.00**	-0.66	0.50	0.66	0.93	-0.22	0.90	1.00	0.66	0.94	0.94	0.96	0.68	**1.00**

HIS = Heat Stress Index; RHI = Relative Heat Stress Index; GMP= Geometric Mean of Productivity; TOL = Tolerance; SSI= Stress Susceptibility Index; YSI= Yield Stability Index; STI= Stress Tolerance Index; MPI = Mean Productivity Index

6.4 Physiological characterization of selected rice genotypes for multiple abiotic stress Tolerance

Locations: CBT, IIRR, KJT, KRK, MTU, NRRI, PTB, REWA, RANCHI, PNR and TTB

Abiotic stress is the main factor negatively affecting crop growth and productivity worldwide. About 90% of rice (Oryza sativa L.) is produced and consumed in Asia, where the demand for rice is on the increase due to increasing population. Rice is a semi-aquatic plant and grown well under lowland flooded anaerobic conditions but to sustain production and productivity of rice under changing climate specially abiotic stresses is big challenge in coming years. As a staple food for nearly half of the world's population, and in light of projected population growth, improving and increasing rice yield is imperative. This book presents current research on abiotic stresses including extreme temperature variance, drought, hypoxia, salinity, heavy metal, nutrient deficiency and toxicity stresses. Going further, it identifies a variety of approaches to alleviate the damaging effects and improving the stress tolerance of rice. In view of the importance of the abiotic stresses in rice production and productivity a trial was formulated to assess tolerance to multiple abiotic stresses under AICRIP Plant physiology Programme.

During kharif-2029 season this trial was conducted in 11 centres with 23 rice genotype taken from AVT-1-IME set and some genotypes were taken from the submergence tolerance set obtained from NRRI. Under this experiment, only laboratory experiments were conducted to screen the above genotypes with the following. 1. Anaerobic germination: In this situation, the genotypes were imposed to the stress by allowing to germinate in water at a depth of 15 cm (Submergence stress). 2. Water stress: Seeds were allowed to germinate under 1% and 2% mannitol solutions. 3. Salinity stress: Sodium chloride of concentration 200mM (Water potential: -1.26, PF: 4.11) was used for germinating the seeds. In case of control situations, seedlings were grown in Hoagland's solution and the following observations were recorded in each of these stresses and control grown situations. Seed germination in percentage, shoot, root lengths in cms and seedling vigour were recorded. Root, shoot length, germination percentage and seedling vigour (Gupta 1998) were recorded during experimental period. Location wise data is presented in *(Tables 6.4.1 to 6.4.16).*

Salinity stress: Screening for salinity tolerance was done at CBT, KJT, KRK, MTU, PNR, PTB, REWA and NRRI centres. Salinity treatment significantly reduced the mean (average of all locations) root and shoot dry weight *(Fig.6.4.1).* The mean root dry weight for

all genotypes was reduced by >55% in comparison with control and the inhibition in mean dry weight is >60%. Significant variation was observed amongst the genotypes. The reduction in mean dry weight varied from 73% (IET 27772) to >39% (IET 27757, IET27758, Brahmana Nakhi). Similarly, the reduction in mean shoot weight varied from >67% (IET 27762) to >36% (IET 27758) with a mean of -60% for all the tested genotypes *(Fig.6.4.1)*

Root length and shoot length is another important seedling trait which show significant reduction under salinity treatment in all the tested genotypes. The reduction in mean root length (mean of all locations) varied from >51% (IET 27773) followed by AC3577, IET 27772 (>50% reduction) to 16% reduction (IET 27737) with a mean (Mean of all genotypes and locations) of >39% reduction in comparison with control treatment *(Fig.6.4.2)*. Similarly, mean shoot length (mean of all genotypes and locations) was reduced by >37% in comparison with control treatment. The reduction in shoot length varied from >50% (Mahulatha) followed by IET 27772 (>46% reduction) to 9.4% (IET 27737). In all other genotypes the reduction in shoot length is >30%, in fact only 9 genotypes recorded less reduction in shoot length than the mean reduction for all genotypes.

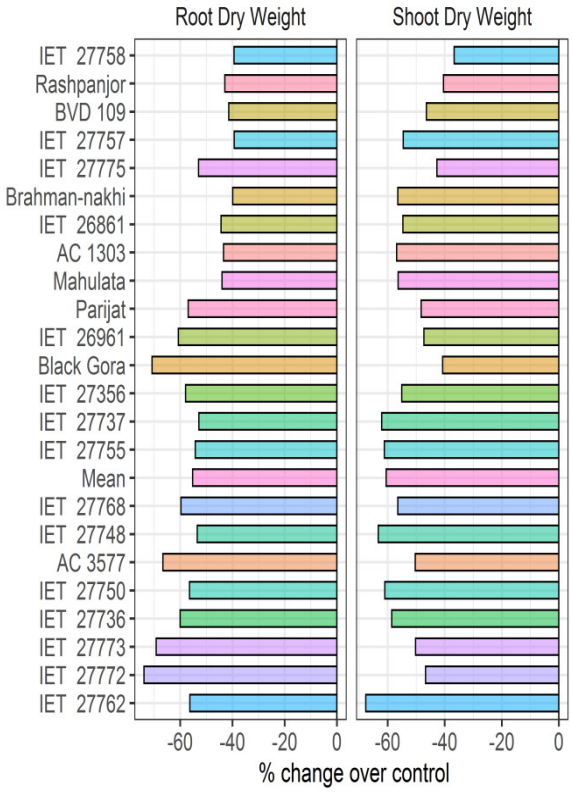


Fig 6.4.1: Influence of salinity stress on root and shoot dry weight of different rice genotypes. Each bar represents the mean of all locations.

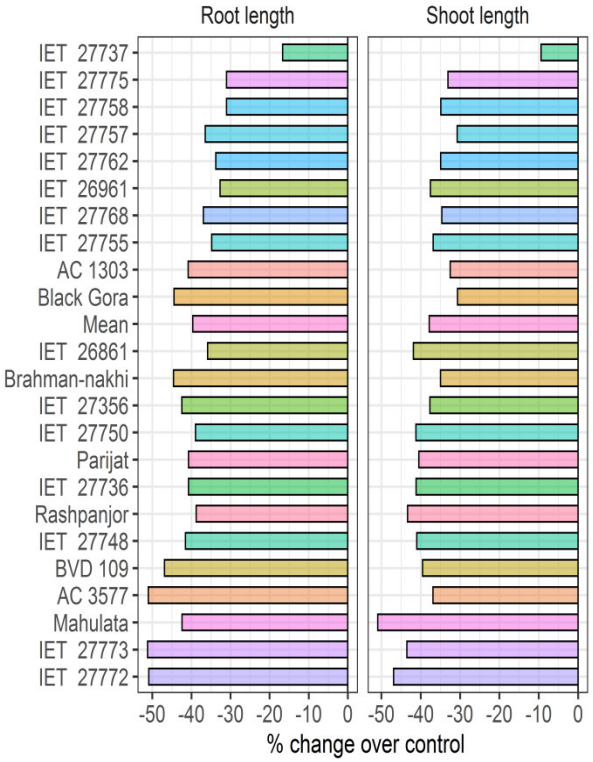


Fig 6.4.2: Influence of salinity stress on root and shoot length of different rice genotypes. Each bar represents the mean of all locations.

Leaf chlorophyll content was measured under both salinity and control treatments. The data revealed that leaf chlorophyll content was reduced significantly under salinity treatment. The mean (mean of all genotypes and all locations) was reduced by >34% in salinity stress in comparison with control treatment (*Fig.6.4.3)*. With the exception of 7 entries, all other genotypes recorded reduction in chlorophyll content from a minimum of 2% reduction (IET27737) to a maximum reduction of >87% (IET27356) followed by IET 27758 and IET 27758 (>70% reduction over control). No significant change in chlorophyll content was observed in IET 27755. Germination % under saline conditions is one of the important criteria for screening for salinity tolerance. The reduction in mean % germination under salinity treatment varied from >79% (IET 27737) followed by IET 27758(>57% reduction) and IET 27775 (>44% reduction over control). The reduction in % germination was lower in IET 27762 (<7% reduction) followed by IET 26861 (9.3% reduction over control). Mahulata, IET 27768, Rashpanjor and IET 27768 are the other genotypes which performed well under salinity treatment with <15% reduction in % germination in comparison with control treatment. These entries may be considered as relatively tolerant genotypes.

Seedling vigour was significantly inhibited by the salinity stress. The mean seedling vigour was reduced by >96% under salinity stress in comparison with control. The % reduction in seedling vigour was non-significant amongst the genotypes. The % reduction in seedling vigour varied from maximum of 99% (IET 27737) followed by IET 27758 (98% reduction over control) to 93% (Mahulata), 94% (IET 27773 and IET 27762 and Parijat) (*Fig.6.4.4).*

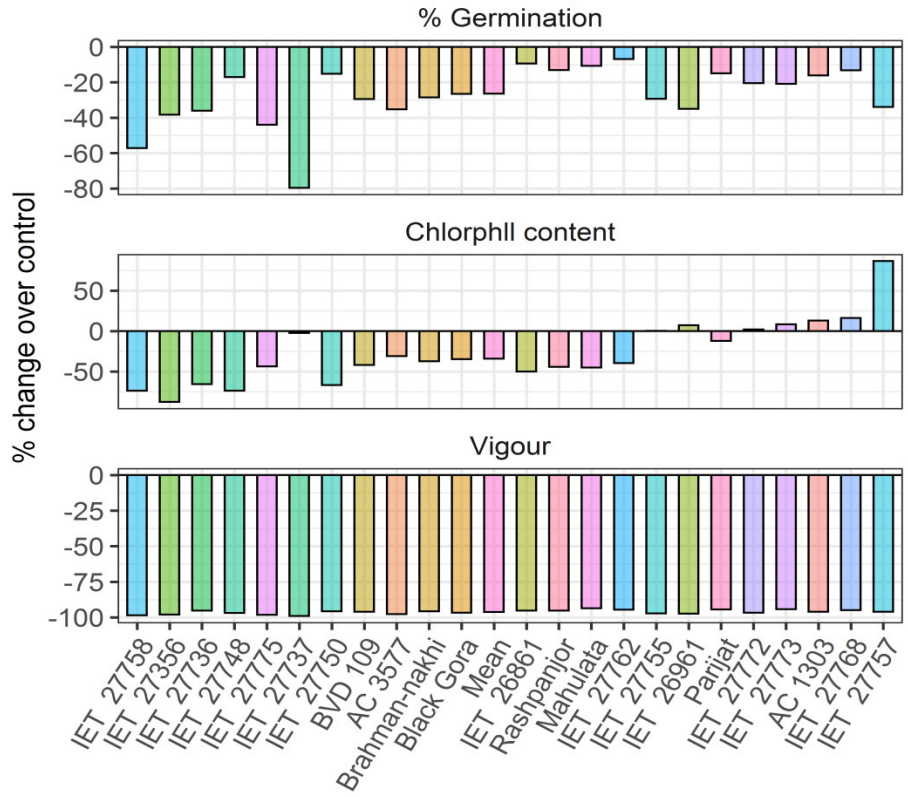


Fig.6.4.3 Influence of salinity stress on % Germination, seedling vigour and total chlorophyll content in different rice genotypes. Each bar represents the mean of all locations and the data was expressed as % change in comparison to control treatment.

Water Stress: Screening for tolerance to water stress was conducted at CBT, KJT, KRK, MTU, PNR, PTB, REWA, TTB and NRRI centers. Water stress was imposed using Mannitol (1% and 2%). Water stress caused reduction in root dry weight (*Fig.6.4.4).* Exposure to Mannitol (1%) resulted in moderate reduction in mean (mean of all genotypes and locations) by >2.6% reduction in comparison to control treatment. Maximum inhibition in root dry weight was observed in IET 27773 followed by IET 27736 to 0.58% reduction (IET 26861). Root dry weight was significantly higher in Mahalata followed by IET 27757 and IET 27758. In fact, as many as 7 genotypes recorded higher root dry weight under water stress (1% Mannitol) treatment (*Fig.6.4.4).*

Exposure to 2% mannitol solution (severe water stress) resulted in significant (>21% reduction in mean root dry weight (mean of all genotypes and locations) comparison to control (*Fig.6.4.4).* Significant variation was noticed amongst the genotypes in their response to imposed water stress. In IET 27737, IET 27773 and Black Gora the reduction in root dry weight is >40% under severe water stress in comparison with control treatment. The

reduction is minimum (<5% over control) in Mahulata, IET 27757, IET 27775 and BVD 109. A significant increase in root dry weight was observed in IET 27758 (*Fig. 6.4.4).*

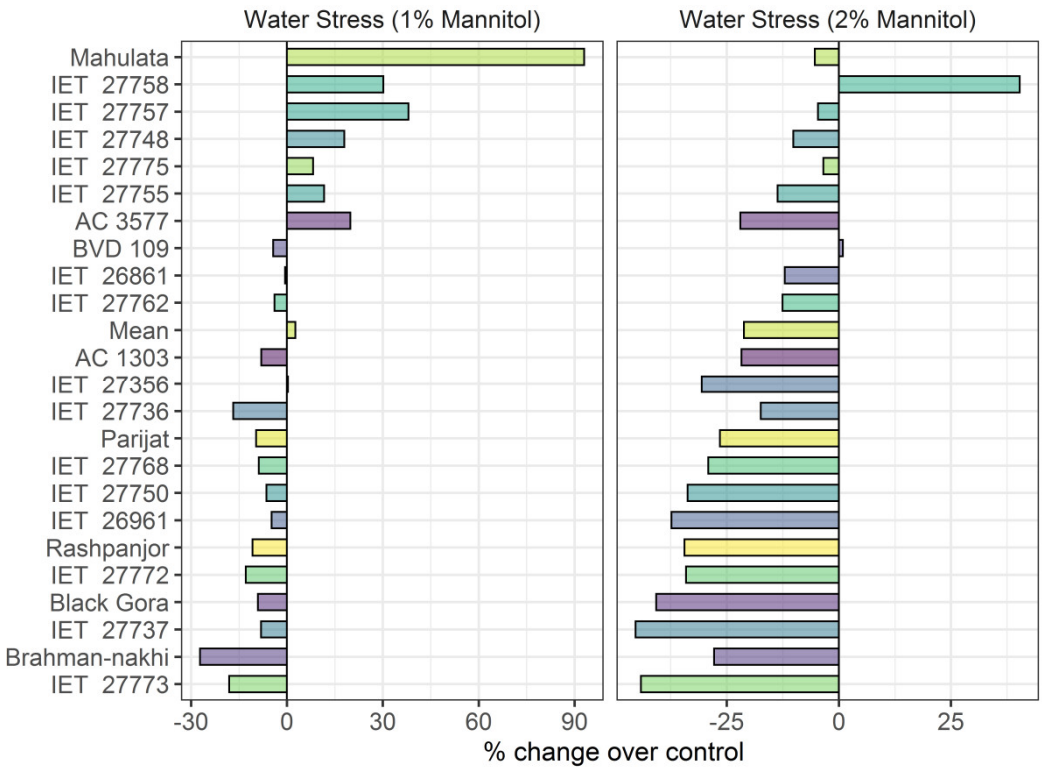


Fig. 6.4.4: Influence of Water stress (1% and 2% Mannitol) on root dry weight in different rice genotypes. Each bar represents the mean of all locations. The data was presented as % change under water stress in comparison with control.

Water stress significantly affected the shoot weight in rice genotypes *(Fig.6.4.5)*. The mean shoot weight (mean of all genotypes and locations) was reduced by >15% under moderate water stress (1% mannitol) in comparison with control. Significant differences were observed amongst the genotypes. The % reduction in shoot dry weight is highest in IET 27748 followed by IET 27736 and minimum reduction is observed in IET 26861 (<1% reduction). IET 27737, IET 27768 and IET 27758 are the other entries which show <5% reduction shoot weight under water stress condition in comparison with control treatment (*Fig.6.4.5).* Similarly, the shoot weight was significantly reduced under severe water stress (2% mannitol) treatment. The mean shoot dry weight was reduced by >39% under severe water stress treatment. Significant differences were noticed between the genotypes in their response to the imposed stress. Maximum reduction in shoot dry weight was observed in IET 27768 followed by IET 27773. Minimum reduction in shoot weight was observed in BVD

109 (>19% reduction). In all other genotypes the reduction in shoot weight under imposed water stress is >30% in comparison with control treatment (*Fig.6.4.5).*

Root length was significantly affected by water stress. Under moderate stress (1% mannitol) the mean root length (mean of all genotypes and locations) was reduced by >15%. Significant differences were observed amongst the genotypes in their response to water stress. The reduction in root length ranged from 29% (BVD 19) to 2% (IET 27758). In fact, in Parijat, IET 27736, IET 26861 and IET 27755 an increase in root length was observed *(Fig.6.4.6*). Exposure to 2% mannitol (severe water stress) had resulted in >27% reduction in mean root length (mean of all genotypes and locations significant differences were observed amongst the genotypes in their response to imposed stress. The reduction root length show significant variation amongst the genotypes which varied from 42% (AC 3577) followed by iET 27737 (41% reduction over control) to 5.4% (IET 27755). IET 27762, IET 27775 and IET 27768 are the other entries in which the reduction in root length was <20% and based on this trait these genotypes are relatively tolerant to severe water stress (*Fig.6.4.6).*

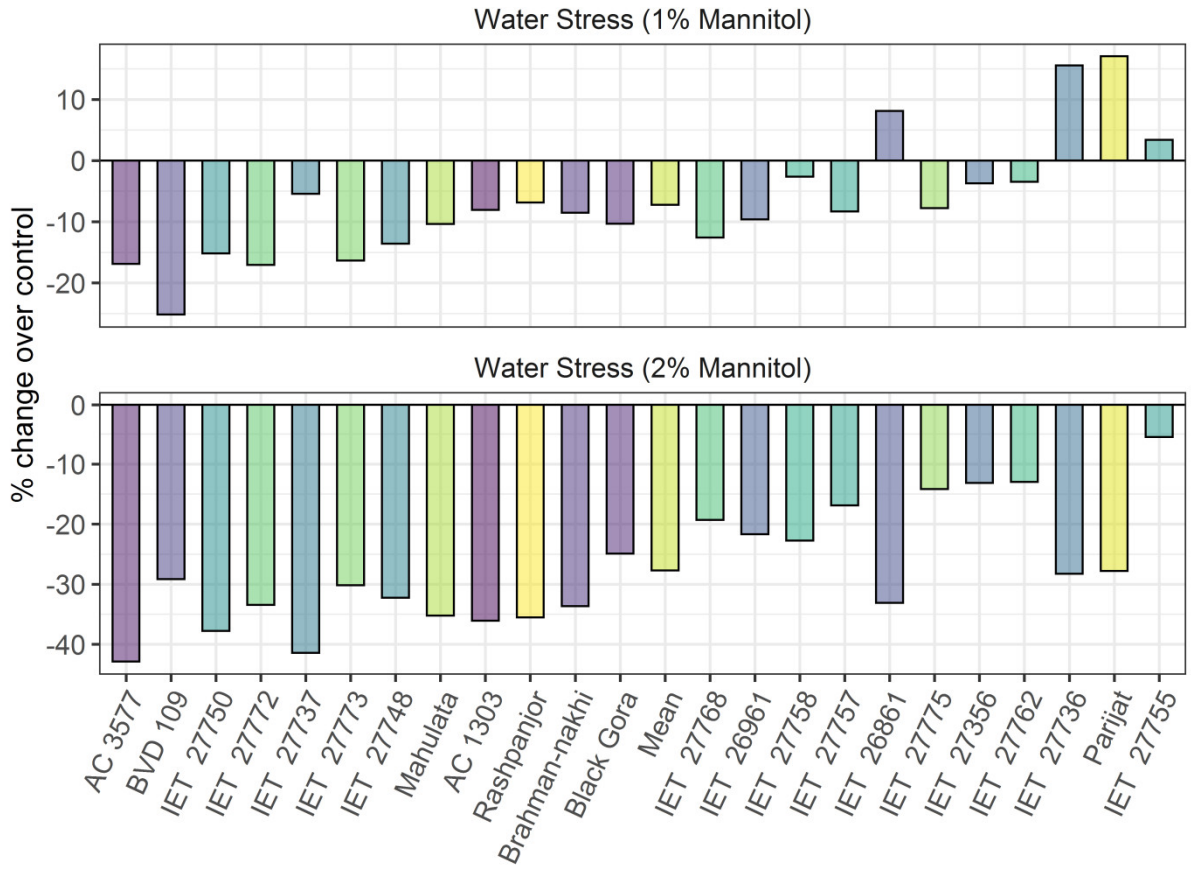


Fig. 6.4.6 : Influence of water stress (1% and 2% mannitol) on root length of different rice genotypes. Each bar represents the mean of all locations. The data was expressed as % change under water stress treatment in comparison to control.

Similarly, shoot length was also significantly influenced by water stress treatment. The mean shoot length (mean of all genotypes and locations) was reduced by 25.7% in comparison with control treatment under 1% mannitol induced water stress. Significant differences were observed amongst the genotypes in their response to imposed stress which varied from >40% (Mahulata) to 8.8% (IET 27750). IET 27750, IET 27356, IET 26861, IET 27775 and IET 27768 are the other genotypes in which the reduction in mean shoot length is <20% under water stress in comparison with control treatment. Furthermore, the reduction in mean shoot length under 2% mannitol induced water stress is >42% in comparison to control *(Fig.6.4.7*). Significant differences were observed amongst the genotypes for their response to imposed water stress (2% mannitol) which varied from >60% (IET 27737) to 32% (IET 27755) followed by BVD 109 and IET 27768 (<35% reduction) these entries may be considered relatively tolerant to imposed stress based on this trait.

The chlorophyll content show significant reduction under water stress treatment. Water stress resulted in >19 and 26% reduction in mean chlorophyll content under 1 and 2% mannitol induced water stress treatment in comparison with control treatment, respectively. Significant variation was observed amongst the genotypes in their response to imposed water stress. Under 1% mannitol induced water stress the reduction in mean chlorophyll content varied from 75% over control (IET 27356) to <1% in IET 27773. IET 27736, Brahman-Nakhi, AC1303 and IET 27755 are the other genotypes showing <10% reduction in chlorophyll content., Parijat, Mhulata, IET 27757, AC3577, IET 27772, Black Gora and IET 26861 show higher mean chlorophyll content under water stress condition in comparison with control treatment (Fig.6.4.8). Similarly, significant differences were noticed amongst the genotypes in % reduction in mean chlorophyll content under 2% mannitol induced water stress. It ranged from 79% (IET 27356) to >3% (IET 27773). The entries IET 27755, IET 26861 and IET 27762 show <15% reduction in mean chlorophyll content. The entries IET 27737, Parijat, Black Gora, IET 27757 and Brahman-Nakhi show an increase in mean chlorophyll content under water stress *(Fig.6.4.8)*.

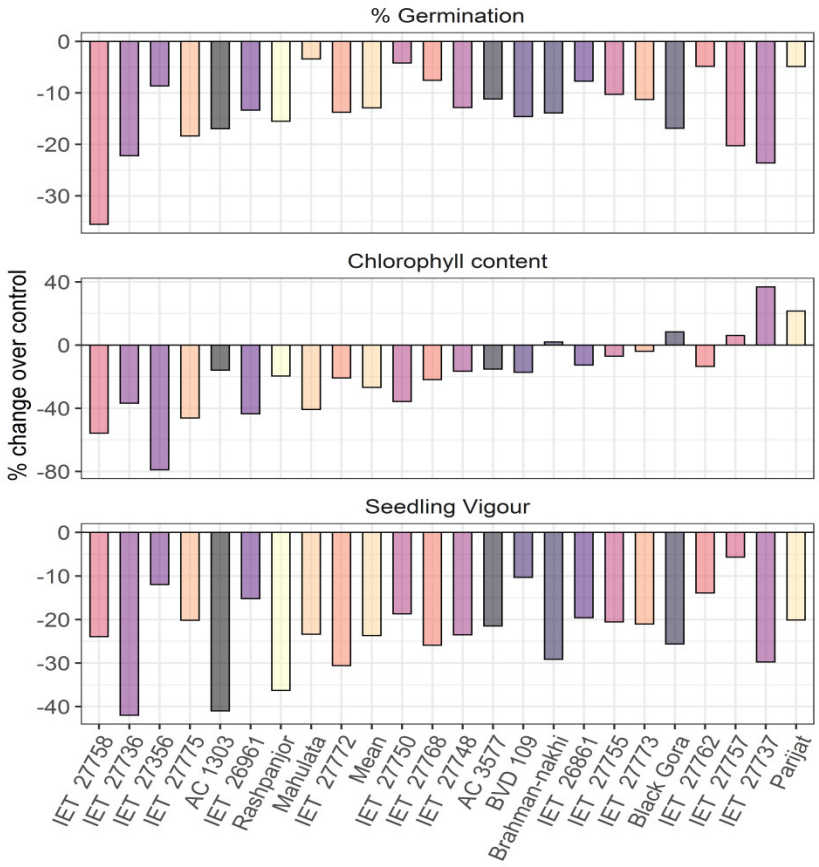


Fig. 6.4.7: Influence of 1% mannitol induced water stress on leaf chlorophyll content, % Germination and Seedling Vigour in different rice genotypes. Each bar represents the mean of all locations. The data was presented as % change in comparison with control treatment.

Germination was significantly affected by water stress treatment. The mean (mean of all genotypes and locations) was reduced by 13% under 1% mannitol induced stress. Significant variation was observed between the genotypes in their response to water stress (Fig.6.4.7). The % reduction in germination ranged from 35% (IET 27758) to 3.4% (Mhulata). The reduction in germination is <5% in IET 27750 , IET 27762 and Prarijat and between 5-10% in IET 27768, IET 26861 and IET 27356. These genotypes with <10% reduction in % germination under moderate water stress may be considered relatively tolerant to water stress. Seedling vigour is another important parameter which was calculated to delineate water stress tolerant genotypes. The mean seedling vigour (mean of all genotypes and locations) was reduced by 23% under water stress Significant differences were noticed amongst the genotypes. The reduction in seedling vigour ranged from 42% (IET 27736) followed by AC 1303 (41%) to 5.6% (IET 27757). The reduction in seedling vigour is <15% in BVD 109, IET 27356 and IET 27762. These entries with lower reduction in seedling vigour may be considered as tolerant genotypes under moderate stress. *(Fig.6.4.7).*

Germination % was significantly affected by the water stress (2% mannitol). The mean (mean of all genotypes and locations) was reduced by 18% in comparison to control treatment. Significant variation was observed amongst the genotypes in their response to imposed stress. The % reduction in germination varied from 35% (IET 27758) to 8.6% (Parijat). In genotypes Mahulata, IET 27768, BVD 109, IET 27762 and IET 27750 the reduction in germination % is <15%. These genotypes could be considered relatively tolerant to water stress. The seedling vigour was reduced under water stress induced by 2% mannitol by 9% in comparison with control. Significant variation was found amongst the genotypes in their response to imposed stress. The reduction in seedling vigour ranged from 40% (Rashpanjar) to 0.15% (Brahman-Nakhi). The genotype BVD 109, IET 27758, Mahulata, IET 27757 show increase in seedling vigour under water stress treatment *(Fig.6.4.8)*. These entries may be considered as relatively water stress tolerant.

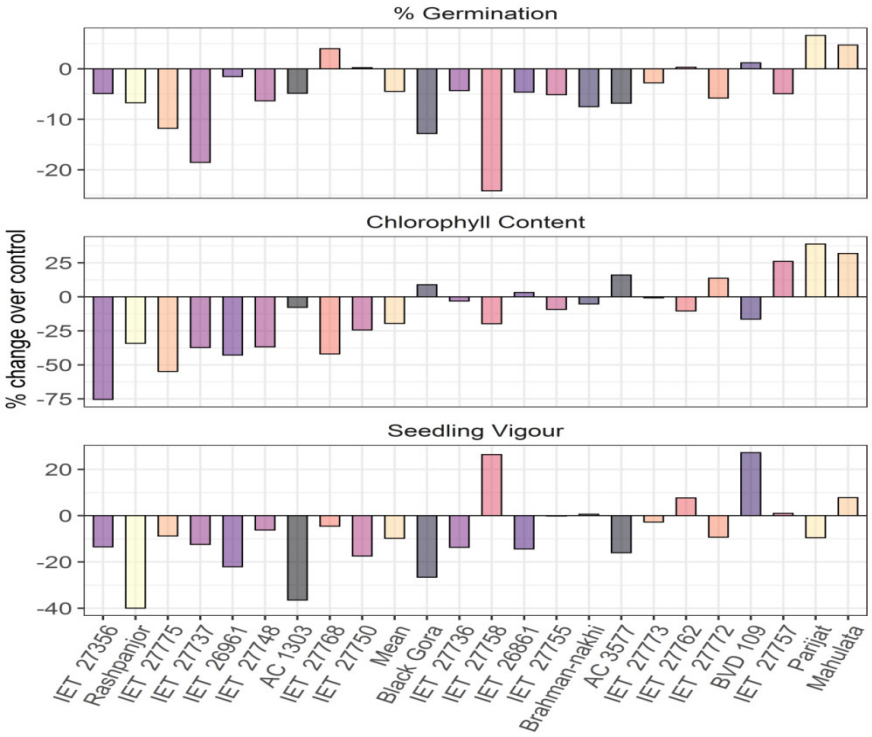


Fig.6.4.8 Influence of 2% mannitol induced water stress on % Germination, seedling vigour and total chlorophyll content in different rice genotypes. Each bar represents the mean of all locations and the data was expressed as % change in comparison to control treatment.

Anaerobic germination: Anaerobic germination (AG) is an important trait for direct-seeded rice (DSR) to be successful. Rice usually has low germination under anaerobic conditions, which leads to a poor crop stand in DSR when rain occurs after seeding. The ability of rice to germinate under water reduces the risk of poor crop stand. Twenty three rice

genotypes were tested for their ability to germinate under anerobic germination. Root length was significantly reduced under anerobic condition. The mean root length was reduced by 65% under anaerobic condition in comparison with control (Fig.6.4.9). Significant differences were noticed amongst the tested entries. The reduction in root length ranged from >89% (Parijat) followed by Brahman-nakhi (84% over control) to 37% (IET 26961) and IET 27756 (39% over control). Similarly shoot length was also significantly reduced under anaerobic condition. The mean shoot length was reduced by 26% over control treatment. Significant differences were observed between the tested entries for their response to anaerobic treatment. The reduction in shoot length ranged from >71% (Parijat) to 3.9% (IET 26961). A minor increase (3% over control) was noticed in IET 27755 *(Fig.6.4.8).*

Mean root dry weight (mean of all genotype and locations) was reduced by 54% under anaerobic condition in comparison with control. Significant differences were observed amongst the genotypes. The reduction in root dry weight ranged from 100% (Parijat), IET 27731 followed by IET 27772 (97% reduction over control) to 24% (IET 26961). IET 27755 and IET 27757 are the other entries showing <30% reduction under anaerobic condition (Fig. 6.4.10). Similarly, the shoot dry weight also show significant reduction. The mean shoot weight was reduced by 44% under anaerobic condition in comparison with control. The reduction in shoot weight ranged from a maximum of 100% (Parijat, IET 27737) followed by IET 27736 (88% reduction) to 15% IET 26961 followed by Black Gora, IET 27366 and IET 27775 (<20% reduction over control).

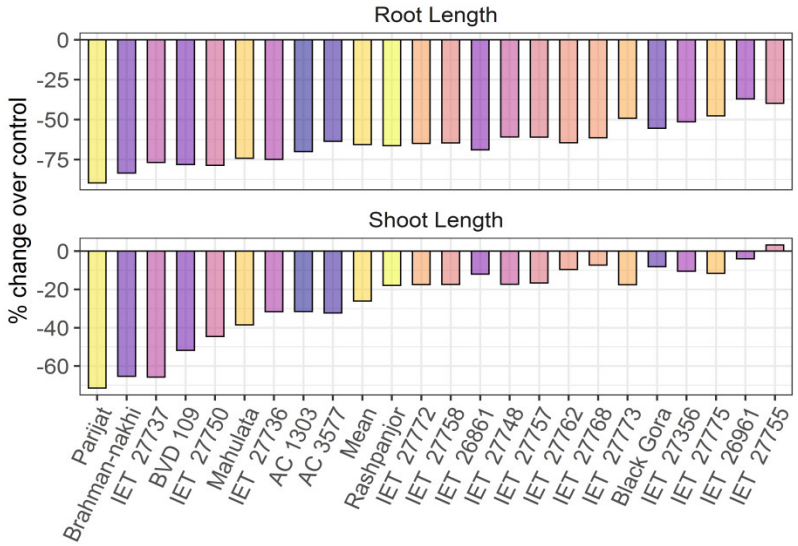


Fig.6.4.9: Influence anaerobic stress on root and shoot length of different rice genotypes. Each bar represent the mean of all locations. Data was presented as % change under anaerobic condition in comparison with control.

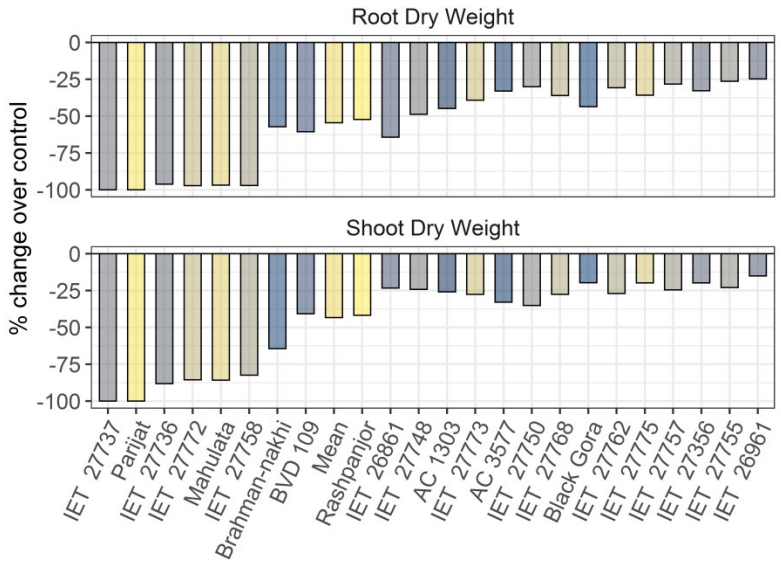


Fig.6.4.10: Influence anaerobic stress on root and shoot weight of different rice genotypes. Each bar represent the mean of all locations. Data was presented as % change under anaerobic condition in comparison with control.

Seed germination was significantly inhibited under anaerobic condition. The mean (mean of all genotypes and locations) was reduced >66% under anaerobic condition. Significant reduction in % germination was observed in all genotypes. The reduction varied from 92% (IET 27737) followed by Brahman-nakhi (83% reduction over control) to AC 3677(46%) followed by IET 27762 and Rashpanjor are the other genotypes in which the reduction in germination % is <50% in comparison to control treatment (Fig.6.4.11). These genotypes showing <50% reduction in germination % may be considered as relatively tolerant to anaerobic condition. The mean Seedling vigour was reduced by 38% under anaerobic condition. Significant differences were observed between the genotypes in their response to anaerobic treatment. The reduction in vigour ranged from 78% (IET 27736) to 2.4% (IET 27768). Rashpanjor, Mahulata, and IET 27356 are the other genotypes showing <20% reduction in vigour under anaerobic condition. These genotypes may be considered as tolerant to anaerobic stress.

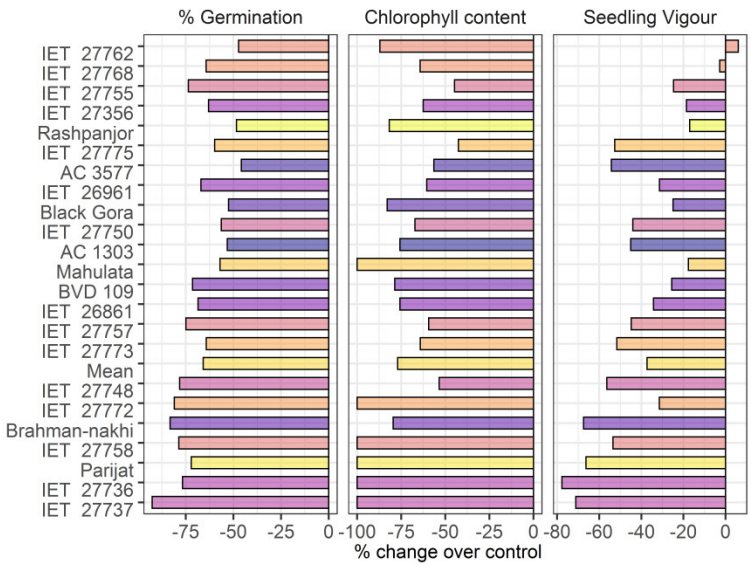


Fig. 6.4.11: Influence of anaerobic stress on % germination, seedling vigour and chlorophyll content in different rice genotypes. Each bar represents the mean of all locations. Data was expressed as % change over control treatment.

Summary & Conclusion

Screening for multiple abiotic stress tolerance was conducted at 11 AICRIP centres for salinity, water stress (1% and 2%) and anaerobic stress. Germination % under saline conditions is one of the important criteria for screening for salinity tolerance. Based on their performance under salinity stress, IET 27762, IET 26861, Mahulata, IET 27768, Rashpanjor and IET 27768 performed well and may be considered as relatively tolerant genotypes. The entries IET 27750 , IET 27762, Parijat, IET 27768, IET 26861 and IET 27356 performed well under moderate water stress (1% mannitol) where as under 2% mannitol induced stress, Mahulata, IET 27768, BVD 109, IET 27762 IET 27750, Brahman-Nakhi), IET 27758 and IET 27757 can be identified as relatively tolerant. Under anaerobic stress, all the tested entries suffered reduction in important physiological trait. However, IET 27768, Rashpanjor, Mahulata, and IET 27356 could be identified as relatively suitable for anaerobic conditions. Entries like IET 27762 show tolerance to salinity and water stress, IET 27768 and Mahulata performed well under salinity, water stress and anaerobic stress, IET 27356 show relative tolerance to water stress and anaerobic stress. These entries could be identified as possessing tolerance to multiple abiotic stresses.

Table 6.4.1 Physiological characterization of selected rice multiple abiotic stress tolerance at *Coimbatore* Kharif 2019

S.No.	Entries	Root Dry weight (g)				Grand Mean	Shoot dry weight (g)				Grand Mean
		Control	Salinity	WS (1% Mon)	WS (2% Mon.)		Control	Salinity	WS (1% Mon)	WS (2% Mon.)	
1	AC 1303	0.094	0.038	0.075	0.094	0.075	0.132	0.038	0.094	0.108	0.093
2	Rashpanjor	0.075	0.028	0.042	0.056	0.050	0.113	0.047	0.099	0.085	0.086
3	Black Gora	0.113	0.028	0.085	0.080	0.076	0.099	0.075	0.104	0.108	0.097
4	Parijat	0.099	0.058	0.075	0.085	0.079	0.104	0.066	0.066	0.104	0.085
5	Brahman-nakhi	0.056	0.036	0.030	0.056	0.045	0.066	0.044	0.052	0.094	0.064
6	AC 3577	0.088	0.014	0.092	0.089	0.071	0.080	0.033	0.080	0.075	0.067
7	Mahulata	0.085	0.056	0.293	0.160	0.148	0.075	0.056	0.075	0.104	0.078
8	BVD 109	0.052	0.052	0.075	0.104	0.071	0.061	0.038	0.080	0.113	0.073
9	IET 27736	0.132	0.042	0.089	0.141	0.101	0.146	0.056	0.078	0.104	0.096
10	IET 26861	0.034	0.031	0.024	0.066	0.039	0.099	0.047	0.094	0.094	0.084
11	IET 27750	0.099	0.024	0.071	0.071	0.066	0.052	0.037	0.052	0.075	0.054
12	IET 27773	0.160	0.047	0.104	0.104	0.104	0.099	0.064	0.099	0.113	0.094
13	IET 27772	0.122	0.015	0.068	0.089	0.074	0.089	0.040	0.082	0.094	0.076
14	IET 27768	0.089	0.038	0.052	0.066	0.061	0.066	0.047	0.069	0.104	0.071
15	IET 27762	0.136	0.040	0.124	0.165	0.116	0.099	0.046	0.080	0.122	0.087
16	IET 27758	0.028	0.028	0.066	0.141	1.979	0.075	0.022	0.094	0.094	0.071
17	IET 27737	0.075	0.014	0.078	0.047	0.054	0.085	0.028	0.103	0.113	0.082
18	IET 27775	0.077	0.019	0.099	0.127	0.080	0.106	0.028	0.075	0.080	0.072
19	IET 27356	0.113	0.020	0.094	0.092	0.080	0.071	0.015	0.085	0.080	0.062
20	IET 27757	0.038	0.033	0.098	0.056	0.056	0.089	0.047	0.094	0.104	0.084
21	IET 26961	0.108	0.028	0.084	0.052	0.068	0.071	0.038	0.089	0.085	0.071
22	IET 27755	0.028	0.014	0.033	0.056	0.033	0.085	0.033	0.080	0.122	0.080
23	IET 27748	0.023	0.014	0.042	0.072	0.038	0.061	0.042	0.056	0.061	0.055
	Mean	**0.084**	**0.031**	**0.082**	**0.090**	**0.155**	**0.088**	**0.043**	**0.082**	**0.097**	**0.077**
	LSD (Treatments)			NS					0.00056**		
	LSD (Variety)			NS					0.00021**		
	Treatments x Variety			NS					0.00025**		
	CV (%)			NS					12.36		

Table 6.4.2 Physiological characterization of selected rice multiple abiotic stress tolerance at Coimbatore Kharif 2019

S.No.	Entries	Total Chlorophyll content				Grand Mean	% Germination				Grand Mean
		Control	Salinity	WS (1% Mon,)	WS (2% Mon.)		Control	Salinity	WS (1% Mon)	WS (2% Mon.)	
1	AC 1303	2.38	0.95	1.90	2.38	1.91	100	70	100	100	93
2	Rashpanjor	1.90	0.72	1.07	1.43	1.28	100	85	100	100	96
3	Black Gora	2.86	0.71	2.14	2.02	1.93	100	60	100	96	89
4	Parijat	2.50	1.48	1.90	2.14	2.00	100	85	100	100	96
5	Brahman-nakhi	1.43	0.90	0.76	1.43	1.13	100	80	100	100	95
6	AC 3577	2.21	0.36	2.33	2.26	1.79	98	75	92	98	91
7	Mahulata	2.14	1.43	1.79	4.05	2.35	100	100	100	100	100
8	BVD 109	1.31	1.29	1.90	2.62	1.78	92	70	90	100	88
9	IET 27736	3.33	1.07	2.26	3.57	2.56	100	80	75	100	89
10	IET 26861	0.83	0.95	0.59	1.67	1.01	100	90	98	90	95
11	IET 27750	2.50	0.59	1.79	1.79	1.67	100	90	92	100	96
12	IET 27773	4.05	1.19	2.62	2.62	2.62	98	70	92	100	90
13	IET 27772	3.10	0.12	1.72	2.26	1.80	100	70	100	85	89
14	IET 27768	2.26	0.95	1.31	2.00	1.63	100	96	98	100	99
15	IET 27762	3.46	1.03	3.14	4.16	2.95	100	100	100	100	100
16	IET 27758	0.72	0.59	1.67	3.57	1.64	70	40	45	60	54
17	IET 27737	1.90	0.36	1.97	1.19	1.36	75	10	65	80	58
18	IET 27775	1.95	0.48	2.50	3.21	2.04	80	35	90	80	71
19	IET 27356	2.86	0.50	2.38	2.33	2.02	100	25	100	96	80
20	IET 27757	0.95	0.83	2.50	1.43	1.43	100	60	96	100	89
21	IET 26961	2.74	0.71	2.12	1.31	1.72	100	45	100	100	86
22	IET 27755	0.71	0.36	0.83	1.43	0.83	100	90	100	100	98
23	IET 27748	0.59	0.35	1.07	1.83	0.96	100	100	100	96	99
	Mean	**2.12**	**0.78**	**1.84**	**2.29**	**1.76**	**96**	**71**	**93**	**95**	**89**
	LSD (Treatments)			0.035**							
	LSD (Variety)			0.078**							
	Treatments x Variety			0.156**							
	CV (%)			4.18							

Table 6.4.3 Physiological characterization of selected rice multiple abiotic stress tolerance at Coimbatore Kharif 2019

S.No.	Entries	Seedling Vigour				Grand Mean	Tolerance				Grand Mean
		Control	Salinity	WS (1% Mon)	WS (2% Mon.)		Control	Salinity	WS (1% Mon)	WS (2% Mon.)	
1	AC 1303	2454	573	1841	2198	1766	0.00	7.00	3.00	3.00	3.25
2	Rashpanjor	2045	695	1534	1534	1452	0.00	9.00	5.00	5.00	4.75
3	Black Gora	2301	675	2045	1963	1746	0.00	5.00	0.00	5.00	2.50
4	Parijat	2198	1147	1534	2045	1731	0.00	7.00	5.00	5.00	4.25
5	Brahman-nakhi	1329	695	890	1636	1138	0.00	9.00	9.00	9.00	6.75
6	AC 3577	1784	383	1722	1754	1411	0.00	9.00	5.00	5.00	4.75
7	Mahulata	1738	1227	1585	2863	1853	0.00	7.00	5.00	0.00	3.00
8	BVD 109	1129	680	1518	2352	1420	0.00	3.00	5.00	1.00	2.25
9	IET 27736	3017	859	1365	2659	1975	0.00	9.00	5.00	3.00	4.25
10	IET 26861	1432	828	1253	1565	1269	7.00	9.00	7.00	7.00	7.50
11	IET 27750	1636	598	1223	1585	1261	0.00	7.00	7.00	7.00	5.25
12	IET 27773	2756	859	2023	2352	1997	0.00	5.00	1.00	1.00	1.75
13	IET 27772	2301	344	1626	1695	1491	0.00	3.00	5.00	5.00	3.25
14	IET 27768	1687	883	1283	1841	1424	0.00	7.00	7.00	7.00	5.25
15	IET 27762	2556	951	2219	3119	2211	0.00	9.00	0.00	0.00	2.25
16	IET 27758	787	196	782	1534	825	0.00	9.00	9.00	9.00	6.75
17	IET 27737	1304	46	1283	1391	1006	0.00	7.00	7.00	7.00	5.25
18	IET 27775	1595	179	1703	1800	1319	0.00	3.00	3.00	5.00	2.75
19	IET 27356	1994	92	1943	1796	1456	0.00	7.00	1.00	5.00	3.25
20	IET 27757	1380	522	2012	1738	1413	0.00	9.00	1.00	5.00	3.75
21	IET 26961	1943	322	1882	1483	1407	0.00	5.00	1.00	7.00	3.25
22	IET 27755	1227	460	1227	1943	1214	0.00	3.00	7.00	5.00	3.75
23	IET 27748	920	614	1074	1394	1000	5.00	3.00	9.00	9.00	6.50
	Mean	**1805**	**601**	**1546**	**1923**	**1469**	**0.52**	**6.57**	**4.65**	**5.00**	**4.18**
	LSD (Treatments)			13.0**					8.58**		
	LSD (Variety)			31.2**					2.057**		
	Treatments x Variety			634**					4.115**		
	CV (%)			2.99					4.66		

Table 6.4.4 Physiological characterization of selected rice multiple abiotic stress tolerance at Karjat Kharif 2019

S.No.	Entries	Seedling Vigour					Grand Mean	Germination (%)					Grand Mean
		Anaerobic germination	Control	Saline Test	WS (1% Mon)	WS (2% Mon.)		Anaerobic germination	Control	Saline Test	WS (1% Mon)	WS (2% Mon.)	
1	AC 1303	1188.7	1665.3	106.7	1350.0	656.0	993.3	29.7	76.3	71.0	72.7	82.7	66.5
2	Rashpanjor	1954.0	1723.3	99.7	1697.3	1198.3	1334.5	47.0	83.7	78.7	92.0	84.0	77.1
3	Black Gora	1302.3	1399.3	98.7	1176.0	618.3	918.9	47.7	77.0	61.0	80.3	71.3	67.5
4	Parijat	761.3	1194.0	150.7	1336.7	877.0	863.9	32.3	78.0	71.3	78.0	75.0	66.9
5	Brahman-nakhi	226.0	708.3	100.3	776.0	637.0	489.5	13.0	63.3	55.7	67.0	76.0	55.0
6	AC 3577	774.7	1580.7	97.0	1079.7	1032.0	912.8	26.3	74.0	61.7	65.3	63.0	58.1
7	Mahulata	2361.0	1938.3	90.7	1277.7	1394.0	1412.3	59.7	88.0	74.0	80.3	81.7	76.7
8	BVD 109	1036.3	970.0	133.3	972.3	1123.7	847.1	39.7	68.3	74.7	68.7	81.7	66.6
9	IET 27736	450.7	1147.3	95.0	653.0	739.3	617.1	15.3	64.7	42.7	48.7	59.3	46.1
10	IET 26861	928.7	1072.3	73.3	665.3	761.0	700.1	28.0	82.3	51.0	54.0	66.3	56.3
11	IET 27750	853.7	1298.7	118.7	1261.7	728.7	852.3	31.0	84.3	79.0	83.3	73.3	70.2
12	IET 27773	771.7	1313.3	99.0	1146.0	1155.3	897.1	22.0	74.3	70.0	66.7	76.3	61.9
13	IET 27772	1458.3	1070.0	54.3	792.7	1239.0	922.9	35.3	75.0	48.3	52.0	73.7	56.9
14	IET 27768	1688.3	1149.3	145.7	1001.7	964.7	989.9	50.0	86.3	83.3	73.7	83.7	75.4
15	IET 27762	1960.0	1294.3	176.0	1238.0	1056.7	1145.0	57.0	89.0	77.7	71.3	71.3	73.3
16	IET 27758	295.0	408.3	46.0	227.7	274.3	250.3	11.7	47.0	31.7	28.3	29.0	29.5
17	IET 27737	376.0	945.7	170.0	568.7	386.0	489.3	13.0	61.0	73.3	35.0	46.7	45.8
18	IET 27775	610.0	1035.7	78.7	719.0	923.7	673.4	18.3	66.7	58.0	53.3	76.7	54.6
19	IET 27356	1208.7	908.0	51.0	1073.0	833.0	814.7	36.7	68.3	50.3	68.3	64.7	57.7
20	IET 27757	807.3	822.0	87.0	817.7	1230.0	752.8	24.3	53.7	51.3	58.7	76.7	52.9
21	IET 26961	766.3	467.3	65.7	629.3	626.7	511.1	24.7	48.3	53.3	53.0	60.0	47.9
22	IET 27755	1346.7	993.0	83.3	777.7	924.3	825.0	40.3	74.0	52.3	66.7	69.3	60.5
23	IET 27748	854.0	1517.7	174.3	1141.3	1003.7	938.2	25.7	85.3	74.3	69.7	69.7	64.9
	Mean	**1042.6**	**1157.5**	**104.1**	**973.0**	**886.2**	**832.7**	**31.7**	**72.6**	**62.8**	**64.7**	**70.1**	**60.4**
	LSD (Treatments)			35.57**							2.14**		
	LSD (Variety)			76.30**							4.59**		
	Treatments x Variety			170.62**							10.27**		
	CV (%)			9.66							8.01		

Table 6.4.5 Physiological characterization of selected rice multiple abiotic stress tolerance on at Karjat Kharif 2019

S.No.	Entries	Root Length (cm)					Grand Mean	Shoot Length (cm)					Grand Mean
		Anaerobic germination	Control	Saline Test	WS (1% Mon)	WS (2% Mon.)		Anaerobic germination	Control	Saline Test	WS (1% Mon)	WS (2% Mon.)	
1	AC 1303	5.93	8.67	0.23	8.31	1.17	4.86	34.37	12.06	1.28	10.27	6.73	12.94
2	Rashpanjor	6.91	8.35	0.14	7.78	6.59	5.95	34.86	11.49	1.13	10.71	7.68	13.17
3	Black Gora	6.38	6.67	0.11	5.72	1.87	4.15	21.05	10.01	1.52	8.91	6.80	9.66
4	Parijat	3.85	8.33	0.51	8.41	4.81	5.18	19.87	7.97	1.60	8.75	6.86	9.01
5	Brahman-nakhi	2.73	6.11	0.23	5.99	2.88	3.59	14.53	5.49	1.57	5.59	5.50	6.54
6	AC 3577	5.78	10.57	0.23	9.14	7.38	6.62	23.91	7.98	1.34	7.39	9.02	9.93
7	Mahulata	8.00	8.84	0.37	7.61	7.71	6.51	31.61	10.47	0.85	8.30	9.35	12.12
8	BVD 109	3.85	7.55	0.45	7.59	6.97	5.28	22.30	7.42	1.34	6.55	6.81	8.88
9	IET 27736	5.17	8.12	0.27	7.01	6.17	5.35	24.36	7.49	1.96	6.50	6.44	9.35
10	IET 26861	5.39	5.72	0.22	5.97	4.47	4.35	27.79	7.31	1.35	6.35	6.98	9.96
11	IET 27750	5.19	9.09	0.34	9.62	4.89	5.83	22.37	6.27	1.15	5.53	5.15	8.09
12	IET 27773	8.25	8.88	0.23	9.04	6.52	6.58	26.78	8.14	1.18	8.15	8.61	10.57
13	IET 27772	8.50	7.98	0.25	8.59	8.62	6.79	32.71	6.93	0.87	6.59	8.19	11.06
14	IET 27768	6.44	6.58	0.63	7.01	5.32	5.20	27.30	5.65	1.12	6.61	6.23	9.38
15	IET 27762	5.72	7.87	0.57	9.18	8.18	6.30	28.67	7.13	1.70	8.17	6.63	10.46
16	IET 27758	5.96	2.81	0.39	2.64	4.37	3.23	19.26	4.95	1.07	5.37	5.07	7.15
17	IET 27737	7.18	7.73	0.54	7.80	3.75	5.40	21.60	8.57	1.78	8.46	4.50	8.98
18	IET 27775	5.93	5.06	0.37	4.45	4.67	4.10	27.19	8.53	0.98	9.00	7.37	10.61
19	IET 27356	7.17	7.13	0.15	7.89	6.43	5.75	25.75	7.31	0.87	7.80	6.43	9.63
20	IET 27757	6.06	7.05	0.34	6.95	7.44	5.57	27.03	8.28	1.30	7.11	8.60	10.46
21	IET 26961	7.94	4.33	0.29	4.75	4.29	4.32	23.10	5.08	0.95	7.14	6.15	8.48
22	IET 27755	6.98	5.67	0.16	6.03	6.77	5.12	26.37	7.52	1.44	5.60	6.65	9.51
23	IET 27748	7.67	8.33	0.55	8.49	8.04	6.62	25.57	9.15	1.79	7.91	6.39	10.16
	Mean	**6.22**	**7.28**	**0.33**	**7.22**	**5.62**	**5.33**	**25.58**	**7.88**	**1.31**	**7.51**	**6.88**	**9.83**
	LSD (Treatments)				0.35**						0.478**		
	LSD (Variety)				0.76**						1.06**		
	Treatments x Variety				1.68**						2.291**		
	CV (%)				14.85						11.01		

Table 6.4.6 Physiological characterization of selected rice multiple abiotic stress tolerance on at Karikal Kharif 2019

S.No.	Entries	Root (cm)					Grand Mean	Shoot length (cm)					Grand Mean	Germination (%)					Grand Mean
		Anaerobic germination	Control	Salinity	WS (1% M)	WS (2% M)		Anaerobic germination	Control	Salinity	WS (1% M)	WS (2% M)		Anaerobic germination	Control	Salinity	WS (1% M)	WS (2% M)	
1	AC 1303	0.27	11.63	9.70	13.40	14.23	9.85	0.07	52.17	26.00	13.43	10.83	20.50	11.3	100.0	87.3	100.0	100.0	79.7
2	Rashpanjor	0.20	12.43	8.97	15.87	11.83	9.86	0.03	44.37	23.30	14.83	9.07	18.32	57.3	100.0	88.7	98.0	100.0	88.8
3	Black Gora	0.17	12.43	9.73	7.33	9.00	7.73	0.17	41.40	21.10	13.03	9.70	17.08	43.3	88.7	73.3	100.0	100.0	81.1
4	Parijat	0.30	12.47	8.07	11.90	9.33	8.41	0.23	36.47	8.53	9.63	9.40	12.85	70.7	100.0	90.0	97.3	100.0	91.6
5	Brahman-nakhi	0.30	14.33	8.07	8.07	10.43	8.24	0.10	36.50	7.40	8.73	8.33	12.21	4.7	97.3	82.0	100.0	100.0	76.8
6	AC 3577	0.17	16.37	9.83	8.70	9.90	8.99	0.10	46.37	10.77	10.53	9.23	15.40	88.0	94.7	28.7	100.0	96.7	81.6
7	Mahulata	0.13	11.47	15.33	9.40	11.20	9.51	0.07	45.90	16.00	11.63	12.47	17.21	76.0	99.3	81.3	100.0	97.3	90.8
8	BVD 109	0.23	11.17	9.70	7.03	7.73	7.17	0.07	29.87	12.47	7.93	8.57	11.78	11.3	100.0	80.0	92.0	100.0	76.7
9	IET 27736	0.30	13.40	8.80	10.23	10.33	8.61	0.13	28.63	11.93	8.50	8.43	11.53	24.7	100.0	62.0	83.3	87.3	71.5
10	IET 26861	0.30	11.30	9.60	10.13	9.20	8.11	0.10	26.13	14.33	10.50	11.37	12.49	6.0	95.3	97.3	96.0	100.0	78.9
11	IET 27750	0.17	12.17	6.60	8.53	7.10	6.91	0.10	20.70	8.20	7.03	7.50	8.71	74.0	98.0	71.3	100.0	100.0	88.7
12	IET 27773	0.47	11.27	6.60	9.00	11.37	7.74	0.10	35.00	12.13	12.03	9.57	13.77	28.0	100.0	100.0	100.0	100.0	85.6
13	IET 27772	0.23	13.80	10.07	7.93	6.10	7.63	0.10	32.43	19.43	9.37	5.93	13.45	6.0	100.0	97.3	92.0	98.0	78.7
14	IET 27768	0.20	14.53	13.40	8.73	8.10	8.99	0.10	33.47	19.53	7.23	6.97	13.46	6.7	98.0	88.0	100.0	100.0	78.5
15	IET 27762	0.13	10.50	8.33	10.40	9.63	7.80	0.17	35.33	20.33	10.90	9.43	15.23	7.3	97.3	100.0	100.0	100.0	80.9
16	IET 27758	0.13	11.27	9.27	7.00	4.97	6.53	0.10	26.93	12.90	9.03	7.63	11.32	4.0	32.0	27.3	23.3	32.7	23.9
17	IET 27737	0.10	7.23	11.53	4.97	9.80	6.73	0.10	28.87	23.03	10.73	9.27	14.40	4.7	44.0	3.3	56.0	28.7	27.3
18	IET 27775	0.10	7.47	11.13	6.03	13.77	7.70	0.10	33.97	25.03	9.17	11.87	16.03	40.7	100.0	73.3	76.7	95.3	77.2
19	IET 27356	0.17	10.00	9.60	11.60	9.87	8.25	0.07	33.57	18.27	7.87	8.97	13.75	18.0	88.0	74.7	92.0	98.0	74.1
20	IET 27757	0.13	9.63	8.47	8.93	10.23	7.48	0.10	31.90	20.67	12.47	12.40	15.51	4.7	86.7	84.7	88.0	98.7	72.5
21	IET 26961	0.20	6.73	9.67	7.97	8.53	6.62	0.10	30.83	19.63	7.43	6.37	12.87	4.0	92.0	90.0	87.3	99.3	74.5
22	IET 27755	0.23	7.57	7.67	9.60	8.77	6.77	0.20	25.63	16.30	10.83	12.17	13.03	2.7	98.7	64.0	100.0	100.0	73.1
23	IET 27748	0.30	12.40	10.00	9.30	9.07	8.21	0.20	31.27	16.23	7.60	7.93	12.65	4.0	100.0	89.3	91.3	100.0	76.9
	Mean	**0.21**	**11.37**	**9.57**	**9.22**	**9.59**	**7.99**	**0.11**	**34.25**	**16.68**	**10.02**	**9.28**	**14.07**	**26.0**	**91.7**	**75.4**	**90.1**	**92.7**	**75.2**
	LSD (Treatments)			1.27**								1.024**					1.69**		
	LSD (Variety)			2.75**								2.195**					3.63**		
	Treatments x Variety			6.12**								4.914**					8.12**		
	CV (%)			20.85								28.37					5.09		

Table 6.4.7 Physiological characterization of selected rice multiple abiotic stress tolerance on at Maruteru Kharif 2019

S.No.	Entries	Root length (cm)				Grand Mean	Shoot Length (cm)				Grand Mean
		Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)		Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)	
1	AC 1303	4.18	1.73	2.58	2.22	2.68	8.08	3.98	4.58	4.20	5.21
2	Rashpanjor	7.42	3.98	2.60	1.28	3.82	8.08	3.62	5.42	3.73	5.21
3	Black Gora	2.75	1.13	1.63	1.85	1.84	5.33	1.42	3.50	3.33	3.40
4	Parijat	4.33	1.92	2.93	2.07	2.81	6.68	3.02	4.47	3.58	4.44
5	Brahman-nakhi	5.33	2.77	3.32	2.93	3.59	5.62	4.42	5.37	5.20	5.15
6	AC 3577	5.45	1.37	4.33	2.37	3.38	7.35	1.45	5.20	4.07	4.52
7	Mahulata	7.82	4.32	5.20	4.73	5.52	8.35	3.08	5.75	3.70	5.22
8	BVD 109	4.97	1.95	3.37	2.75	3.26	6.92	2.42	4.98	2.62	4.23
9	IET 27736	6.98	3.73	5.73	3.93	5.10	6.00	3.52	4.17	3.27	4.24
10	IET 26861	5.07	2.63	4.20	2.75	3.66	6.33	3.60	5.85	4.33	5.03
11	IET 27750	4.75	2.70	4.27	2.83	3.64	5.62	3.25	4.38	3.63	4.22
12	IET 27773	5.77	4.42	5.28	4.57	5.01	7.45	4.68	5.58	5.28	5.75
13	IET 27772	6.07	2.87	3.13	3.52	3.90	5.83	3.55	5.60	3.98	4.74
14	IET 27768	5.72	3.27	4.00	3.50	4.12	6.88	2.67	5.67	4.93	5.04
15	IET 27762	3.85	2.95	3.32	3.20	3.33	7.25	3.42	5.68	5.33	5.42
16	IET 27758	4.65	4.18	4.53	3.42	4.20	6.05	4.32	4.70	4.42	4.87
17	IET 27737	4.47	2.17	1.43	3.77	2.96	5.37	1.75	4.02	3.87	3.75
18	IET 27775	4.40	3.02	3.60	3.37	3.60	6.88	2.80	4.98	3.27	4.48
19	IET 27356	5.22	2.68	3.68	3.43	3.75	6.07	2.72	4.62	4.15	4.39
20	IET 27757	5.47	4.32	4.82	4.60	4.80	4.97	3.27	4.63	3.78	4.16
21	IET 26961	5.00	3.17	4.43	3.87	4.12	6.27	3.17	4.57	4.47	4.62
22	IET 27755	6.87	4.10	4.68	4.25	4.98	5.78	2.58	5.13	3.85	4.34
23	IET 27748	5.45	1.77	4.83	4.47	4.13	5.42	1.20	5.33	4.98	4.23
	Mean	**5.30**	**2.92**	**3.82**	**3.29**	**3.83**	**6.46**	**3.04**	**4.96**	**4.09**	**4.64**
	LSD (Treatments)			0.388**					0.303**		
	LSD (Variety)			0.922**					0.727**		
	Treatments x Variety			1.840**					1.456**		
	CV (%)			22.5					14.76		

Table 6.4.8 Physiological characterization of selected rice multiple abiotic stress tolerance on at Maruteru Kharif 2019

S.No.	Entries	Germination (%)				Grand Mean	Seedling Vigour				Grand Mean
		Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)		Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)	
1	AC 1303	99.7	91.7	20.0	12.3	55.9	1222	524	144	81	493
2	Rashpanjor	97.3	81.0	12.0	6.3	49.2	1509	615	96	32	563
3	Black Gora	83.7	73.7	17.0	6.0	45.1	677	188	89	31	246
4	Parijat	100.0	81.0	90.0	84.0	88.8	1102	400	666	475	661
5	Brahman-nakhi	88.7	69.3	84.7	72.0	78.7	973	500	734	586	698
6	AC 3577	99.3	81.3	93.3	84.0	89.5	1269	229	891	542	733
7	Mahulata	97.0	79.7	91.0	84.3	88.0	1569	590	995	712	967
8	BVD 109	99.3	83.7	90.0	86.3	89.8	1180	367	752	463	690
9	IET 27736	99.3	64.3	91.0	89.7	86.1	1289	467	900	644	825
10	IET 26861	100.0	82.0	96.0	94.7	93.2	1140	512	964	670	821
11	IET 27750	99.0	90.3	96.3	91.0	94.2	1026	539	835	588	747
12	IET 27773	99.3	86.3	98.0	91.7	93.8	1313	787	1065	903	1017
13	IET 27772	95.3	88.0	91.7	88.7	90.9	1132	563	800	667	791
14	IET 27768	99.3	84.0	91.0	88.0	90.6	1252	496	879	746	843
15	IET 27762	99.3	80.7	94.0	83.3	89.3	1103	514	848	711	794
16	IET 27758	99.3	22.3	82.0	77.3	70.3	1062	191	753	605	653
17	IET 27737	96.7	14.3	87.0	84.0	70.5	951	55	474	642	530
18	IET 27775	100.0	45.0	68.0	44.0	64.3	1128	268	583	294	568
19	IET 27356	99.3	82.7	91.0	86.7	89.9	1121	448	756	657	745
20	IET 27757	91.0	76.3	65.3	55.3	72.0	950	579	616	466	653
21	IET 26961	99.3	61.7	72.3	63.0	74.1	1119	390	657	526	673
22	IET 27755	99.7	45.3	66.3	50.7	65.5	1261	301	652	411	656
23	IET 27748	99.3	56.7	65.0	58.7	69.9	1080	167	662	555	616
	Mean	**97.4**	**70.5**	**76.2**	**68.8**	**78.2**	**1149**	**421**	**687**	**522**	**695**
	LSD (Treatments)			1.17**					45.41**		
	LSD (Variety)			2.809**					108.89**		
	Treatments x Variety			5.619**					217.78**		
	CV (%)			4.55					14.74		

Table 6.4.9 Physiological characterization of selected rice multiple abiotic stress tolerance on at Pantnagar Kharif 2019

S.No.	Entries	Root Length (cm)					Grand Mean	Shoot Length (cm)					Grand Mean
		Anaerobic germination	Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)		Anaerobic germination	Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)	
1	AC 1303	4.13	9.87	2.77	7.03	4.13	5.59	14.30	19.93	17.40	9.87	8.00	13.90
2	Rashpanjor	3.23	9.60	3.00	8.27	2.33	5.29	13.30	14.33	11.27	9.67	5.03	10.72
3	Black Gora	2.90	7.93	5.27	4.50	2.80	4.68	10.67	11.07	10.27	8.23	6.90	9.43
4	Parijat	0.00	9.00	2.40	7.67	4.17	4.65	0.00	11.03	9.63	9.37	6.73	7.35
5	Brahman-nakhi	2.10	5.30	2.23	3.00	2.27	2.98	6.23	8.07	6.33	3.90	3.50	5.61
6	AC 3577	4.37	5.80	2.40	4.00	2.67	3.85	5.57	7.57	6.23	6.50	3.20	5.81
7	Mahulata	0.00	8.90	0.00	7.10	3.17	3.83	0.00	9.43	0.00	8.87	3.67	4.39
8	BVD 109	4.60	9.97	4.17	6.30	2.93	5.59	9.40	11.50	9.27	7.43	5.77	8.67
9	IET 27736	0.00	7.37	3.27	6.33	3.07	4.01	0.00	9.23	8.27	8.70	3.80	6.00
10	IET 26861	2.47	8.07	5.23	6.33	3.43	5.11	11.17	13.23	11.20	11.13	4.20	10.19
11	IET 27750	3.50	7.27	6.37	5.20	2.60	4.99	6.00	8.70	7.40	6.07	3.10	6.25
12	IET 27773	4.50	8.23	3.17	6.30	3.07	5.05	6.43	10.33	9.63	9.07	6.60	8.41
13	IET 27772	0.00	9.83	5.10	6.93	3.30	5.03	0.00	11.97	10.70	7.40	5.53	7.12
14	IET 27768	4.10	9.87	3.30	5.53	3.70	5.30	9.30	11.63	10.27	7.27	4.83	8.66
15	IET 27762	3.23	6.20	3.23	4.90	2.57	4.03	8.23	10.27	8.33	8.13	3.07	7.61
16	IET 27758	0.00	7.13	0.00	3.90	2.37	2.68	0.00	7.53	0.00	5.03	3.90	3.29
17	IET 27737	0.00	5.40	5.10	4.20	2.03	3.35	0.00	8.27	6.20	4.77	2.47	4.34
18	IET 27775	5.07	9.20	4.20	4.27	2.90	5.13	8.93	11.33	9.63	9.17	5.67	8.95
19	IET 27356	4.50	8.17	2.63	3.37	3.50	4.43	12.07	13.17	11.27	9.43	5.03	10.19
20	IET 27757	4.17	10.27	2.07	7.63	2.50	5.33	12.27	14.17	12.20	9.97	3.10	10.34
21	IET 26961	4.13	11.13	0.00	6.23	3.53	5.01	10.37	13.27	0.00	9.80	4.20	7.53
22	IET 27755	3.90	9.13	2.17	8.27	3.17	5.33	9.07	12.17	10.53	11.13	6.20	9.82
23	IET 27748	4.23	8.63	2.23	5.23	2.23	4.51	8.00	10.53	8.70	6.30	4.93	7.69
	Mean	**2.83**	**8.36**	**3.06**	**5.76**	**2.98**	**4.60**	**7.01**	**11.25**	**8.47**	**8.14**	**4.76**	**7.93**
	LSD (Treatments)				0.12**						0.074**		
	LSD (Variety)				0.266**						0.158**		
	Treatments x Variety				0.596**						0.353**		
	CV (%)				6.114						2.11		

Table 6.4.10 Physiological characterization of selected rice multiple abiotic stress tolerance on at Pantnagar Kharif 2019

S.No.	Entries	Root Dry Weight (mg)					Grand Mean	Shoot Dry Weight (mg)					Grand Mean
		Anaerobic germination	Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)		Anaerobic germination	Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)	
1	AC 1303	30.33	51.67	5.23	37.00	18.00	28.45	51.00	72.00	13.33	56.00	43.33	47.13
2	Rashpanjor	26.00	53.33	2.93	43.33	6.00	26.32	44.00	86.33	13.00	54.00	36.00	46.67
3	Black Gora	21.33	39.00	4.73	26.00	14.00	21.01	41.33	64.00	10.67	45.00	34.00	39.00
4	Parijat	0.00	42.33	4.30	21.33	14.33	16.46	0.00	53.00	9.33	44.67	29.00	27.20
5	Brahman-nakhi	16.67	37.33	3.53	18.00	14.33	17.97	24.00	63.33	7.33	32.00	21.00	29.53
6	AC 3577	22.33	32.67	5.33	25.67	19.33	21.07	31.67	54.00	9.67	32.33	28.00	31.13
7	Mahulata	0.00	36.00	0.00	24.33	17.67	15.60	0.00	53.00	0.00	34.00	27.00	22.80
8	BVD 109	17.33	40.67	2.50	14.33	7.00	16.37	30.67	45.00	7.67	37.33	24.33	29.00
9	IET 27736	0.00	37.33	3.90	15.00	9.67	13.18	0.00	53.33	9.00	33.33	23.33	23.80
10	IET 26861	12.00	33.00	2.50	15.33	7.33	14.03	45.00	60.67	12.33	51.00	41.67	42.13
11	IET 27750	33.00	43.33	5.67	33.33	22.33	27.53	46.00	64.67	13.00	50.33	45.00	43.80
12	IET 27773	26.33	44.00	5.67	27.33	19.33	24.53	41.00	62.67	10.00	52.00	31.67	39.47
13	IET 27772	0.00	51.67	4.33	39.67	30.00	25.13	0.00	55.00	10.33	52.67	34.00	30.40
14	IET 27768	34.67	54.00	5.00	45.00	31.00	33.93	40.33	62.33	10.67	54.00	35.33	40.53
15	IET 27762	31.00	42.67	7.50	33.67	26.00	28.17	46.67	71.00	14.67	54.33	46.00	46.53
16	IET 27758	0.00	37.67	0.00	24.00	19.00	16.13	0.00	47.00	0.00	33.33	23.33	20.73
17	IET 27737	0.00	57.00	6.00	46.33	31.00	28.07	0.00	60.67	12.00	54.00	38.67	33.07
18	IET 27775	36.00	55.67	8.03	37.00	28.33	33.01	45.00	62.00	10.00	51.33	35.00	40.67
19	IET 27356	23.33	34.33	5.47	25.00	17.00	21.03	47.00	64.00	11.33	54.00	41.00	43.47
20	IET 27757	45.67	62.67	6.67	54.00	36.67	41.13	51.00	71.00	13.33	57.00	44.00	47.27
21	IET 26961	40.33	54.00	0.00	43.67	32.00	34.00	46.00	60.67	0.00	47.00	36.67	38.07
22	IET 27755	38.33	52.67	4.33	44.33	28.00	33.53	41.67	61.00	9.00	52.00	33.00	39.33
23	IET 27748	28.00	53.33	6.00	34.67	22.67	28.93	45.00	64.00	11.33	56.33	36.00	42.53
	Mean	**20.99**	**45.49**	**4.33**	**31.67**	**20.48**	**24.59**	**31.19**	**61.33**	**9.48**	**47.30**	**34.23**	**36.71**
	LSD (Treatments)				0.756**						0.559**		
	LSD (Variety)				1.62**						1.199**		
	Treatments x Variety				3.625**						2.68**		
	CV (%)				6.9						3.44		

Table 6.4.11 Physiological characterization of selected rice multiple abiotic stress tolerance on at Pantnagar Kharif 2019

S.No.	Entries	Total chlorophyll					Grand Mean	Germination %					Grand Mean	Seedling Vigour					Grand Mean
		Anaerobic germination	Control	Salinity	WS (1% M)	WS (2% M)		Anaerobic germination	Control	Salinity	WS (1% M)	WS (2% M)		Anaerobic germination	Control	Salinity	WS (1% M)	WS (2% M)	
1	AC 1303	0.42	1.73	0.55	0.66	0.54	0.78	55.0	96.7	0.0	96.7	95.0	68.7	787	1927	0	954	760	885
2	Rashpanjor	0.34	1.86	0.54	0.72	0.56	0.80	50.0	100.0	0.0	98.3	91.7	68.0	665	1433	0	950	461	702
3	Black Gora	0.28	1.64	0.40	0.52	0.38	0.64	51.7	96.7	0.0	90.0	85.0	64.7	551	1070	0	741	587	590
4	Parijat	0.00	1.73	0.52	1.03	0.83	0.82	0.0	96.7	0.0	96.7	93.3	57.3	0	1066	0	905	629	520
5	Brahman-nakhi	0.25	1.22	0.56	0.87	0.77	0.73	41.7	96.7	0.0	73.3	55.0	53.3	259	780	0	286	192	303
6	AC 3577	0.54	1.24	0.60	0.66	0.42	0.69	25.0	55.0	0.0	41.7	20.0	28.3	139	416	0	271	64	178
7	Mahulata	0.00	1.32	0.00	1.18	0.95	0.69	0.0	98.3	0.0	98.3	96.7	58.7	0	927	0	872	354	431
8	BVD 109	0.31	1.45	0.70	1.08	0.64	0.84	50.0	91.7	0.0	86.7	81.7	62.0	470	1054	0	644	471	528
9	IET 27736	0.00	1.56	0.32	0.62	0.54	0.61	16.7	95.0	0.0	86.7	86.7	57.0	0	877	0	754	329	392
10	IET 26861	0.42	1.73	0.54	0.68	0.51	0.78	56.7	98.3	0.0	98.3	93.3	69.3	633	1301	0	1094	392	684
11	IET 27750	0.41	1.25	0.61	0.78	0.75	0.76	60.0	100.0	0.0	100.0	93.3	70.7	360	870	0	607	289	425
12	IET 27773	0.43	1.20	0.75	1.07	1.02	0.89	56.7	100.0	0.0	91.7	88.3	67.3	364	1033	0	831	583	562
13	IET 27772	0.00	1.78	0.43	0.85	0.73	0.76	0.0	88.3	0.0	86.7	78.3	50.7	0	1057	0	641	433	426
14	IET 27768	0.59	1.65	0.77	0.98	0.65	0.93	58.3	98.3	0.0	98.3	91.7	69.3	542	1144	0	714	443	569
15	IET 27762	0.23	1.78	0.59	0.95	0.67	0.84	56.7	96.7	0.0	100.0	76.7	66.0	466	992	0	813	235	501
16	IET 27758	0.00	1.66	0.00	0.87	0.64	0.63	0.0	30.0	0.0	25.0	25.0	16.0	0	226	0	126	98	90
17	IET 27737	0.00	1.79	0.63	1.24	1.12	0.95	0.0	43.3	0.0	36.7	30.0	22.0	0	358	0	174	74	121
18	IET 27775	0.97	1.69	0.60	1.44	0.78	1.10	41.7	91.7	0.0	90.0	85.0	61.7	372	1039	0	825	482	544
19	IET 27356	0.54	1.44	0.86	1.17	1.06	1.01	50.0	100.0	0.0	98.3	81.7	66.0	603	1317	0	928	411	652
20	IET 27757	0.75	1.85	0.63	1.47	0.95	1.13	35.0	100.0	0.0	86.7	83.3	61.0	429	1417	0	864	258	594
21	IET 26961	0.47	1.19	0.00	0.76	0.51	0.59	43.3	98.3	0.0	95.0	90.0	65.3	449	1304	0	930	378	612
22	IET 27755	0.63	1.14	0.43	1.74	0.85	0.96	35.0	100.0	0.0	96.7	76.7	61.7	317	1217	0	1076	475	617
23	IET 27748	0.54	1.16	0.67	0.83	0.73	0.79	33.3	100.0	0.0	98.3	96.7	65.7	267	1053	0	619	477	483
	Mean	**0.35**	**1.52**	**0.51**	**0.96**	**0.72**	**0.81**	**35.5**	**90.1**	**0.0**	**85.7**	**78.0**	**57.9**	**334**	**1038**	**0**	**723**	**386**	**496**
	LSD (Treatments)				0.0058**					1.497**							6.925**		
	LSD (Variety)				0.0125**					3.212**							14.853**		
	Treatments x Variety				0.0279**					7.182**							33.21**		
	CV (%)				1.6					5.82							3.15		

Table 6.4.12 Physiological characterization of selected rice multiple abiotic stress tolerance on at Pattambi Kharif 2019

S.No.	Entries	Root Dry Weight (mg)				Grand Mean	Shoot Dry Weight (mg)				Grand Mean
		Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)		Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)	
1	AC 1303	0.96	5.18	2.12	2.02	2.57	0.06	0.03	0.01	0.02	0.03
2	Rashpanjor	0.66	2.55	2.20	0.47	1.47	0.05	0.03	0.01	0.02	0.02
3	Black Gora	0.35	1.59	2.02	1.25	1.30	0.02	0.02	0.01	0.02	0.02
4	Parijat	0.40	1.83	2.57	2.34	1.79	0.03	0.01	0.01	0.01	0.01
5	Brahman-nakhi	0.68	1.03	2.11	0.40	1.06	0.04	0.01	0.01	0.02	0.02
6	AC 3577	2.57	2.21	2.46	2.43	2.42	0.05	0.01	0.02	0.02	0.03
7	Mahulata	1.90	1.33	0.46	1.46	1.29	0.03	0.01	0.03	0.01	0.02
8	BVD 109	1.82	1.46	1.14	1.19	1.40	0.02	0.01	0.03	0.02	0.02
9	IET 27736	1.88	1.05	0.20	1.70	1.21	0.03	0.01	0.02	0.02	0.02
10	IET 26861	2.77	1.25	2.35	3.56	2.48	0.02	0.01	0.01	0.02	0.02
11	IET 27750	1.42	0.07	0.09	0.34	0.48	0.02	0.01	0.03	0.00	0.02
12	IET 27773	1.53	6.60	1.55	2.02	2.93	0.03	0.05	0.00	0.01	0.02
13	IET 27772	1.47	7.02	1.32	4.51	3.58	0.05	0.07	0.01	0.01	0.04
14	IET 27768	2.03	6.15	1.44	0.19	2.45	0.03	0.02	0.02	0.01	0.02
15	IET 27762	1.54	2.09	0.58	1.29	1.38	0.04	0.01	0.04	0.01	0.02
16	IET 27758	5.03	0.03	0.09	0.09	1.31	0.03	0.11	0.04	0.00	0.04
17	IET 27737	0.22	1.83	2.14	0.14	1.08	0.06	0.01	0.05	0.00	0.03
18	IET 27775	10.31	7.54	3.08	1.30	5.56	0.02	0.03	0.02	0.02	0.02
19	IET 27356	17.47	0.75	0.40	0.03	4.66	0.02	0.02	0.01	0.00	0.01
20	IET 27757	1.77	10.09	2.30	3.82	4.50	0.05	0.04	0.01	0.01	0.02
21	IET 26961	3.39	8.16	0.08	1.48	3.28	0.01	0.03	0.00	0.00	0.01
22	IET 27755	2.00	3.65	1.85	0.95	2.11	0.04	0.03	0.04	0.01	0.03
23	IET 27748	3.04	0.13	4.42	0.98	2.14	0.03	0.07	0.03	0.02	0.04
	Mean	**2.84**	**3.20**	**1.61**	**1.48**	**2.28**	**0.03**	**0.03**	**0.02**	**0.01**	**0.02**
	LSD (Treatments)				0.202**				0.008**		
	LSD (Variety)				0.485**				0.019**		
	Treatments x Variety				0.971**				0.038**		
	CV (%)				20.04				28.3		

Table 6.4.13 Physiological characterization of selected rice multiple abiotic stress tolerance on at Pattambi Kharif 2019

S.No.	Entries	Root Length (cm)				Grand Mean	Shoot Length (cm)				Grand Mean	Total Chlorophyll				Grand Mean
		Control	Salinity	WS (1% M)	WS (2% M)		Control	Salinity	WS (1% M)	WS (2% M)		Control	Salinity	WS (1% M)	WS (2% M)	
1	AC 1303	16.75	12.33	13.17	3.75	11.50	32.50	24.67	32.33	15.50	26.25	0.96	5.18	2.12	2.02	2.57
2	Rashpanjor	14.33	11.00	9.83	2.33	9.38	33.50	27.67	35.50	14.00	27.67	0.66	2.55	2.20	0.47	1.47
3	Black Gora	8.17	4.67	13.00	2.67	7.13	15.33	12.50	19.03	7.67	13.63	0.35	1.59	2.02	1.25	1.30
4	Parijat	9.33	9.83	14.00	3.67	9.21	17.00	10.17	21.00	10.00	14.54	0.40	1.83	2.57	2.34	1.79
5	Brahman-nakhi	14.83	5.67	14.50	3.17	9.54	17.33	8.83	22.83	13.33	15.58	0.68	1.03	2.11	0.40	1.06
6	AC 3577	15.83	9.33	12.67	2.00	9.96	15.67	16.17	20.33	13.50	16.42	2.57	2.21	2.46	2.43	2.42
7	Mahulata	6.00	5.42	9.50	4.17	6.27	17.83	15.33	19.00	14.67	16.71	1.90	1.33	0.46	1.46	1.29
8	BVD 109	5.67	2.83	2.83	2.83	3.54	8.67	7.67	13.33	11.83	10.38	1.82	1.46	1.14	1.19	1.40
9	IET 27736	12.33	8.50	13.00	3.83	9.42	19.67	17.83	17.83	13.17	17.13	1.88	1.05	0.20	1.70	1.21
10	IET 26861	7.33	9.33	9.33	6.17	8.04	11.00	12.50	20.33	15.33	14.79	2.77	1.25	2.35	3.56	2.48
11	IET 27750	8.83	5.00	2.00	7.17	5.75	11.33	10.00	29.00	15.00	16.33	1.42	0.07	0.09	0.34	0.48
12	IET 27773	13.00	10.00	5.67	4.00	8.17	18.00	12.17	16.67	15.33	15.54	1.53	6.60	1.55	2.02	2.93
13	IET 27772	17.83	8.67	7.67	6.33	10.13	24.00	11.50	17.83	14.67	17.00	1.47	7.02	1.32	4.51	3.58
14	IET 27768	11.33	10.70	9.83	8.83	10.18	13.00	8.42	23.17	18.33	15.73	2.03	6.15	1.44	0.19	2.45
15	IET 27762	7.67	5.67	2.20	8.00	5.88	19.83	13.00	17.97	13.83	16.16	1.54	2.09	0.58	1.29	1.38
16	IET 27758	6.33	8.83	7.50	2.83	6.38	15.67	14.00	21.00	11.33	15.50	5.03	0.03	0.09	0.09	1.31
17	IET 27737	9.57	8.00	12.50	0.00	7.52	12.67	14.50	15.50	0.00	10.67	0.22	1.83	2.14	0.14	1.08
18	IET 27775	4.83	10.67	5.17	6.92	6.90	10.00	14.00	17.00	18.83	14.96	10.31	7.54	3.08	1.30	5.56
19	IET 27356	9.00	10.17	11.50	4.50	8.79	25.33	16.33	30.50	12.50	21.17	17.47	0.75	0.40	0.03	4.66
20	IET 27757	10.33	10.17	14.50	7.83	10.71	22.33	13.00	23.00	19.67	19.50	1.77	10.09	2.30	3.82	4.50
21	IET 26961	4.33	13.17	2.00	1.83	5.33	9.67	13.17	8.50	7.33	9.67	3.39	8.16	0.08	1.48	3.28
22	IET 27755	9.83	11.50	10.67	4.33	9.08	20.67	13.83	16.67	13.50	16.17	2.00	3.65	1.85	0.95	2.11
23	IET 27748	11.33	11.00	5.43	3.67	7.86	15.67	15.50	11.88	12.33	13.85	3.04	0.13	4.42	0.98	2.14
	Mean	**10.21**	**8.80**	**9.06**	**4.38**	**8.11**	**17.68**	**14.03**	**20.44**	**13.12**	**16.32**	**2.84**	**3.20**	**1.61**	**1.48**	**2.28**
	LSD (Treatments)			1.096**					1.618**					0.202**		
	LSD (Variety)			2.627**					3.88**					0.485**		
	Treatments x Variety			5.255**					7.76**					0.971**		
	CV (%)			30					22					20.1		

Table 6.4.14 Physiological characterization of selected rice multiple abiotic stress tolerance on at REWA Kharif 2019

S.No.	Entries	Root Dry Weight (g)				Grand Mean	Shoot Dry Weight (g)				Grand Mean
		Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)		Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)	
1	AC 1303	0.054	0.040	0.051	0.042	0.047	0.060	0.023	0.033	0.018	0.034
2	Rashpanjor	0.073	0.065	0.073	0.070	0.070	0.077	0.031	0.047	0.027	0.045
3	Black Gora	0.054	0.014	0.045	0.028	0.035	0.053	0.017	0.037	0.014	0.030
4	Parijat	0.041	0.015	0.037	0.023	0.029	0.040	0.023	0.033	0.017	0.028
5	Brahman-nakhi	0.050	0.044	0.045	0.038	0.044	0.063	0.014	0.043	0.015	0.034
6	AC 3577	0.035	0.024	0.031	0.025	0.029	0.053	0.031	0.037	0.027	0.037
7	Mahulata	0.081	0.048	0.072	0.055	0.064	0.080	0.022	0.060	0.019	0.045
8	BVD 109	0.044	0.019	0.033	0.020	0.029	0.047	0.011	0.047	0.006	0.028
9	IET 27736	0.055	0.017	0.044	0.035	0.038	0.067	0.028	0.040	0.022	0.039
10	IET 26861	0.074	0.037	0.072	0.069	0.063	0.077	0.040	0.047	0.037	0.050
11	IET 27750	0.085	0.047	0.080	0.069	0.070	0.087	0.020	0.070	0.018	0.049
12	IET 27773	0.054	0.023	0.040	0.031	0.037	0.073	0.013	0.050	0.007	0.036
13	IET 27772	0.072	0.032	0.067	0.050	0.055	0.057	0.033	0.047	0.030	0.041
14	IET 27768	0.073	0.042	0.071	0.059	0.061	0.077	0.032	0.050	0.029	0.047
15	IET 27762	0.065	0.038	0.048	0.041	0.048	0.070	0.012	0.057	0.007	0.037
16	IET 27758	0.078	0.059	0.075	0.073	0.071	0.087	0.025	0.067	0.019	0.049
17	IET 27737	0.051	0.030	0.042	0.023	0.036	0.057	0.021	0.047	0.016	0.035
18	IET 27775	0.065	0.053	0.057	0.055	0.058	0.077	0.021	0.053	0.019	0.043
19	IET 27356	0.058	0.045	0.055	0.053	0.053	0.047	0.029	0.030	0.028	0.034
20	IET 27757	0.063	0.048	0.056	0.052	0.055	0.067	0.012	0.057	0.007	0.035
21	IET 26961	0.089	0.062	0.085	0.073	0.077	0.087	0.031	0.053	0.028	0.050
22	IET 27755	0.071	0.040	0.063	0.054	0.057	0.083	0.030	0.047	0.029	0.047
23	IET 27748	0.042	0.017	0.033	0.022	0.029	0.057	0.022	0.033	0.017	0.032
	Mean	0.062	0.037	0.055	0.046	0.050	0.067	0.023	0.047	0.020	0.039
	LSD (Treatments)			0.0033**					0.0052**		
	LSD (Variety)			0.008**					0.0126**		
	Treatments x Variety			0.0161**					0.025**		
	CV (%)			15.2					30.2		

Table 6.4.15 Physiological characterization of selected rice multiple abiotic stress tolerance on at REWA Kharif 2019

S.No	Entries	Root Length (cm)				Grand Mean	Shoot Length (cm)				Grand Mean
		Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)		Control	Salinity	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)	
1	AC 1303	10.27	6.00	9.90	8.33	8.63	12.50	8.07	11.37	10.50	10.61
2	Rashpanjor	14.23	9.73	13.30	10.40	11.92	16.33	11.73	14.67	12.40	13.78
3	Black Gora	17.23	7.37	13.70	10.37	12.17	19.47	9.43	15.13	12.43	14.12
4	Parijat	10.57	4.30	8.30	5.17	7.08	13.17	7.17	10.23	8.03	9.65
5	Brahman-nakhi	12.03	6.90	12.00	9.20	10.03	13.70	8.43	13.07	10.73	11.48
6	AC 3577	14.60	6.93	13.20	9.53	11.07	16.07	8.17	14.10	10.77	12.28
7	Mahulata	17.67	8.07	15.20	11.50	13.11	19.57	9.77	16.40	13.20	14.73
8	BVD 109	14.30	9.70	11.03	10.33	11.34	15.57	10.73	11.80	11.37	12.37
9	IET 27736	17.33	10.17	14.63	12.40	13.63	19.57	12.33	16.10	14.57	15.64
10	IET 26861	17.20	8.27	14.00	11.53	12.75	19.50	10.47	15.50	13.73	14.80
11	IET 27750	18.70	12.33	15.93	14.80	15.44	21.23	14.70	17.57	17.17	17.67
12	IET 27773	14.37	9.27	12.27	10.00	11.48	16.40	11.23	13.60	11.97	13.30
13	IET 27772	13.33	7.97	11.47	8.37	10.28	15.50	11.33	12.87	10.40	12.53
14	IET 27768	20.27	16.90	19.33	17.97	18.62	22.23	18.63	20.57	19.70	20.28
15	IET 27762	16.40	13.40	16.33	14.23	15.09	18.60	15.40	17.73	16.23	16.99
16	IET 27758	16.70	12.53	16.77	14.73	15.18	19.47	15.07	18.53	17.27	17.58
17	IET 27737	17.63	11.37	13.27	11.90	13.54	19.27	12.83	14.30	13.37	14.94
18	IET 27775	19.17	9.93	18.40	15.00	15.63	20.80	11.50	19.47	16.57	17.08
19	IET 27356	14.47	6.60	11.70	10.40	10.79	16.43	8.43	12.97	12.23	12.52
20	IET 27757	15.63	12.20	13.10	12.93	13.47	16.90	13.23	13.87	13.97	14.49
21	IET 26961	15.53	10.30	11.80	10.73	12.09	17.63	12.20	13.13	12.63	13.90
22	IET 27755	16.27	12.87	15.43	13.20	14.44	18.43	14.80	16.80	15.13	16.29
23	IET 27748	16.73	9.93	14.80	10.23	12.93	19.37	12.50	16.53	12.80	15.30
	Mean	**15.68**	**9.70**	**13.73**	**11.45**	**12.64**	**17.73**	**11.66**	**15.06**	**13.36**	**14.45**
	LSD (Treatments)				0.569**				0.590**		
	LSD (Variety)				1.365**				1.417**		
	Treatments x Variety				2.73**				2.834**		
	CV (%)				10.16				9.2		

Table 6.4.16 Physiological characterization of selected rice multiple abiotic stress tolerance on at Titabar Kharif 2019

S.No.	Entries	Root Length (cm)				Grand Mean	Shoot Length (cm)				Grand Mean	Germination %				Grand Mean
		Anaerobic germination	Control	WS (1% M)	WS (2% M)		Anaerobic germination	Control	WS (1% M)	WS (2% M)		Anaerobic germination	Control	WS (1% M)	WS (2% M)	
1	AC 1303	4.50	19.33	17.50	4.67	11.50	31.83	33.50	31.00	24.17	30.13	77.7	98.7	85.0	76.0	84.3
2	Rashpanjor	5.50	16.67	15.17	13.83	12.79	35.17	31.33	27.50	19.33	28.33	43.3	99.3	90.0	82.0	78.7
3	Black Gora	4.83	5.00	2.17	6.67	4.67	36.83	12.33	8.83	11.17	17.29	28.3	98.0	65.0	48.3	59.9
4	Parijat	0.00	10.33	7.50	4.00	5.46	0.00	15.17	10.50	12.00	9.42	0.0	95.0	80.0	68.3	60.8
5	Brahman-nakhi	0.00	5.33	3.50	3.00	2.96	0.00	10.17	7.83	8.83	6.71	0.0	98.0	43.3	28.3	42.4
6	AC 3577	5.17	9.83	7.67	4.83	6.88	23.50	16.50	12.67	15.83	17.13	32.7	94.0	65.0	49.7	60.3
7	Mahulata	4.50	19.67	19.33	4.83	12.08	23.33	23.67	19.83	16.50	20.83	27.7	95.0	88.3	58.3	67.3
8	BVD 109	0.00	11.00	8.17	4.33	5.88	0.00	17.17	14.17	14.67	11.50	0.0	94.0	38.3	23.3	38.9
9	IET 27736	5.33	14.17	13.00	4.50	9.25	18.50	17.50	12.50	6.83	13.83	25.0	91.3	43.3	28.3	47.0
10	IET 26861	4.17	14.67	13.33	1.67	8.46	22.83	23.67	19.67	5.00	17.79	25.0	92.0	81.7	20.0	54.7
11	IET 27750	0.00	13.00	12.00	5.17	7.54	0.00	15.67	9.00	6.50	7.79	0.0	96.0	81.5	38.3	54.0
12	IET 27773	3.83	5.17	3.00	7.33	4.83	19.17	10.17	7.17	12.00	12.13	25.0	94.0	53.3	15.0	46.8
13	IET 27772	5.00	7.50	4.50	2.33	4.83	23.17	16.50	10.83	4.17	13.67	26.7	95.0	55.0	23.3	50.0
14	IET 27768	4.00	7.17	5.17	3.83	5.04	21.17	11.67	7.33	2.83	10.75	20.0	96.0	73.3	51.7	60.3
15	IET 27762	4.50	13.67	12.33	3.50	8.50	28.67	20.00	15.83	8.67	18.29	78.3	95.0	84.0	65.0	80.6
16	IET 27758	4.00	7.33	5.17	2.83	4.83	23.67	12.67	9.33	6.33	13.00	28.3	97.0	38.3	20.0	45.9
17	IET 27737	0.00	11.00	10.33	2.50	5.96	0.00	17.67	14.00	6.17	9.46	0.0	92.0	35.0	18.3	36.3
18	IET 27775	5.50	10.00	7.83	3.83	6.79	25.83	16.33	12.33	4.17	14.67	40.0	92.0	55.0	20.0	51.8
19	IET 27356	4.67	8.67	6.33	8.67	7.08	21.67	12.50	8.50	9.33	13.00	25.0	95.0	53.3	21.7	48.8
20	IET 27757	3.67	9.00	6.67	5.00	6.08	17.83	14.33	10.83	6.50	12.38	20.0	95.0	25.0	15.0	38.8
21	IET 26961	4.83	5.00	3.17	2.67	3.92	21.33	8.00	4.33	3.50	9.29	38.3	96.0	55.0	38.3	56.9
22	IET 27755	5.17	4.67	2.67	8.50	5.25	22.50	11.00	7.67	11.50	13.17	18.3	93.3	77.7	63.3	63.2
23	IET 27748	4.50	13.33	14.00	8.50	10.08	22.17	16.67	10.67	8.50	14.50	20.0	96.0	81.7	45.0	60.7
	Mean	**3.64**	**10.50**	**8.72**	**5.09**	**6.99**	**19.09**	**16.70**	**12.71**	**9.76**	**14.57**	**26.1**	**95.1**	**63.0**	**39.9**	**56.0**
	LSD (Treatments)			0.929**					1.254**					3.943**		
	LSD (Variety)			2.228**					3.009**					9.45**		
	Treatments x Variety			4.456**					6.018**					18.91**		
	CV (%)			30.1					19.04					15.84		

Table 6.4.17 Physiological characterization of selected rice multiple abiotic stress tolerance on at Titabar Kharif 2019

S.No.	Entries	Root Dry Weight (g)				Grand Mean	Shoot Dry Weight (g)				Grand Mean
		Anerobic germination	Control	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)		Anerobic germination	Control	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)	
1	AC 1303	1.33	5.74	4.77	1.23	3.27	12.13	13.23	11.43	8.27	11.27
2	Rashpanjor	1.80	4.95	4.15	2.90	3.45	13.43	12.23	10.18	6.57	10.60
3	Black Gora	1.50	1.48	1.00	1.77	1.44	13.97	4.87	3.21	3.80	6.46
4	Parijat	0.00	3.03	2.07	1.20	1.58	0.00	6.00	3.87	4.13	3.50
5	Brahman-nakhi	0.00	1.58	0.97	0.83	0.85	0.00	4.00	2.87	3.03	2.48
6	AC 3577	1.53	2.93	2.10	1.27	1.96	8.90	6.45	4.70	5.47	6.38
7	Mahulata	1.33	5.87	5.23	1.27	3.43	8.90	9.33	7.33	5.67	7.81
8	BVD 109	0.00	3.30	2.23	1.10	1.66	0.00	6.80	5.27	5.05	4.28
9	IET 27736	1.60	4.20	3.53	1.23	2.64	7.13	6.90	4.57	2.33	5.23
10	IET 26861	1.33	4.37	3.63	0.77	2.53	8.70	9.33	7.27	1.73	6.76
11	IET 27750	0.00	3.87	3.28	1.35	2.12	0.00	6.20	3.33	2.20	2.93
12	IET 27773	1.33	1.53	1.00	1.90	1.44	7.27	4.03	2.67	4.13	4.53
13	IET 27772	1.53	2.23	1.37	0.70	1.46	8.90	6.53	4.00	1.43	5.22
14	IET 27768	1.23	2.13	1.37	1.17	1.47	8.10	4.60	2.72	1.07	4.12
15	IET 27762	1.37	4.10	3.37	0.97	2.45	10.93	7.90	5.83	2.97	6.91
16	IET 27758	1.20	2.20	1.43	0.77	1.40	9.17	5.00	3.47	2.17	4.95
17	IET 27737	0.00	3.20	2.85	0.80	1.71	0.00	6.93	5.17	2.13	3.56
18	IET 27775	1.63	2.93	2.10	0.99	1.92	9.87	6.47	4.53	1.53	5.60
19	IET 27356	1.50	2.63	1.77	2.23	2.03	8.30	4.93	3.17	3.19	4.90
20	IET 27757	1.17	2.65	1.80	1.30	1.73	6.80	5.60	4.00	2.23	4.66
21	IET 26961	1.43	1.50	1.00	0.77	1.18	8.17	3.13	1.63	1.30	3.56
22	IET 27755	1.53	1.43	1.00	2.20	1.54	8.60	4.27	2.85	3.93	4.91
23	IET 27748	1.37	3.99	3.80	1.90	2.76	8.47	6.57	3.92	2.83	5.45
	Mean	**1.12**	**3.12**	**2.43**	**1.33**	**2.00**	**7.29**	**6.58**	**4.69**	**3.36**	**5.48**
	LSD (Treatments)			0.253**					0.463**		
	LSD (Variety)			0.608**					1.111**		
	Treatments x Variety			1.217**					2.222**		
	CV (%)			28.6					19.08		

Table 6.4.18 Physiological characterization of selected rice multiple abiotic stress tolerance on at NRRI Kharif 2019

S.No.	Entries	Root Length (cm)				Grand Mean	Shoot Length (cm)				Grand Mean
		Control	Saline Test	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)		Control	Saline Test	Water Stress (1% Mannitol)	Water Stress (2% Mannitol)	
1	AC 1303	14.67	9.00	10.49	18.77	13.23	21.57	39.17	15.50	27.67	25.98
2	Rashpanjor	13.77	8.63	11.40	9.70	10.88	36.30	30.33	33.53	23.63	30.95
3	Black Gora	6.33	9.33	7.07	10.93	8.42	20.37	30.00	26.63	21.73	24.68
4	Parijat	8.47	9.33	14.00	12.87	11.17	28.53	27.67	30.87	22.27	27.33
5	Brahman-nakhi	6.93	9.67	10.90	10.57	9.52	23.57	25.00	22.93	21.50	23.25
6	AC 3577	16.00	10.33	17.60	14.43	14.59	35.03	33.67	31.90	18.93	29.88
7	Mahulata	16.43	11.67	5.43	9.60	10.78	43.87	36.33	16.43	20.93	29.39
8	BVD 109	11.03	7.00	6.27	11.93	9.06	28.27	26.33	15.33	20.90	22.71
9	IET 27736	11.20	7.00	26.57	15.67	15.11	32.57	22.00	28.73	16.53	24.96
10	IET 26861	11.03	5.33	17.57	10.80	11.18	30.97	26.00	22.70	15.00	23.67
11	IET 27750	14.37	7.67	14.03	7.97	11.01	27.27	20.00	27.87	12.40	21.88
12	IET 27773	18.53	6.00	17.60	10.03	13.04	33.17	19.67	26.43	15.97	23.81
13	IET 27772	15.53	9.00	17.83	16.03	14.60	28.40	20.00	26.97	17.40	23.19
14	IET 27768	15.10	8.00	14.53	17.17	13.70	26.50	22.67	27.00	21.77	24.48
15	IET 27762	16.03	9.33	17.80	19.63	15.70	29.87	31.67	27.83	19.67	27.26
16	IET 27758	14.60	10.00	14.50	13.67	13.19	25.00	25.00	25.37	19.80	23.79
17	IET 27737	0.00	9.00	0.00	0.00	2.25	0.00	28.00	0.00	0.00	7.00
18	IET 27775	17.43	12.33	17.97	12.57	15.08	27.07	28.67	28.20	19.27	25.80
19	IET 27356	15.47	10.67	15.63	17.87	14.91	25.50	26.67	32.33	22.47	26.74
20	IET 27757	17.40	12.00	9.53	14.87	13.45	26.83	31.67	28.43	21.80	27.18
21	IET 26961	14.73	10.33	13.67	11.37	12.53	26.80	24.67	26.20	19.43	24.28
22	IET 27755	14.73	10.33	14.50	16.70	14.07	30.77	24.00	24.07	20.00	24.71
23	IET 27748	17.37	8.00	14.97	14.20	13.63	35.10	26.33	30.90	22.83	28.79
	Mean	**13.36**	**9.13**	**13.47**	**12.93**	**12.22**	**27.97**	**27.20**	**25.05**	**19.21**	**24.86**
	LSD (Treatments)			0.778**					1.272**		
	LSD (Variety)			1.867**					3.050**		
	Treatments x Variety			3.735**					6.10**		
	CV (%)			14.37					11.54		

Table 6.4.19 Physiological characterization of selected rice multiple abiotic stress tolerance on at NRRI Kharif 2019

S.No.	Entries	Root Dry weight (g)				Grand Mean	Shoot Dry weight (g)				Grand Mean	Total Chlorophyll				Grand Mean
		Control	Saline Test	WS (1% M)	WS (2% M)		Control	Saline Test	WS (1% M)	WS (2% M)		Control	Saline Test	WS (1% M)	WS (2% M)	
1	AC 1303	0.02	25.86	0.02	0.02	6.48	21.57	39.17	15.50	27.67	25.98	2.65	2.05	1.81	2.18	2.17
2	Rashpanjor	0.03	22.91	0.02	0.02	5.75	0.038	93.14	0.048	0.042	23.316	4.61	1.22	3.27	3.48	3.14
3	Black Gora	0.02	13.76	0.03	0.01	3.46	0.082	65.57	0.062	0.036	16.437	2.69	2.23	3.49	4.56	3.24
4	Parijat	0.04	10.81	0.03	0.04	2.73	0.051	34.79	0.067	0.018	8.732	2.00	1.99	2.56	3.89	2.61
5	Brahman-nakhi	0.02	14.46	0.01	0.01	3.63	0.060	50.88	0.076	0.053	12.766	2.76	1.33	2.47	3.17	2.43
6	AC 3577	0.04	10.81	0.04	0.02	2.73	0.031	47.87	0.036	0.016	11.989	1.86	2.27	1.23	4.03	2.35
7	Mahulata	0.06	23.36	0.01	0.02	5.86	0.087	50.75	0.079	0.019	12.735	2.31	1.45	1.11	3.65	2.13
8	BVD 109	0.02	15.42	0.01	0.03	3.87	0.068	60.77	0.025	0.031	15.222	3.54	1.27	2.60	2.34	2.44
9	IET 27736	0.01	12.33	0.04	0.01	3.10	0.030	30.46	0.018	0.059	7.641	2.95	0.90	3.06	3.61	2.63
10	IET 26861	0.03	12.68	0.03	0.01	3.19	0.064	33.08	0.074	0.011	8.307	2.73	1.28	3.42	2.58	2.50
11	IET 27750	0.03	19.63	0.03	0.01	4.92	0.088	40.57	0.058	0.027	10.185	2.86	1.40	2.50	3.19	2.49
12	IET 27773	0.04	10.80	0.04	0.01	2.72	0.091	39.37	0.075	0.010	9.886	1.95	0.93	3.15	3.00	2.26
13	IET 27772	0.03	12.87	0.04	0.01	3.24	0.105	35.80	0.063	0.014	8.995	1.90	0.85	2.64	1.88	1.82
14	IET 27768	0.03	9.02	0.03	0.02	2.27	0.072	23.41	0.075	0.024	5.894	2.11	1.48	2.56	1.83	2.00
15	IET 27762	0.03	18.28	0.03	0.01	4.59	0.089	33.30	0.074	0.039	8.376	2.18	1.69	3.08	1.91	2.22
16	IET 27758	0.03	17.33	0.03	0.02	4.35	0.089	50.30	0.065	0.034	12.622	2.13	1.88	1.59	3.35	2.24
17	IET 27737	0.00	22.87	0.00	0.00	5.72	0.050	44.91	0.054	0.026	11.259	0.00	1.00	0.00	0.00	0.25
18	IET 27775	0.03	19.87	0.03	0.02	4.99	0.000	61.86	0.000	0.000	15.464	3.02	0.94	2.11	2.38	2.11
19	IET 27356	0.04	26.09	0.05	0.02	6.55	0.092	55.78	0.082	0.038	13.998	2.40	0.86	1.13	2.52	1.73
20	IET 27757	0.01	15.85	0.02	0.02	3.98	0.057	37.99	0.088	0.037	9.544	2.49	1.63	1.22	2.70	2.01
21	IET 26961	0.03	16.43	0.03	0.02	4.12	0.029	36.81	0.047	0.031	9.230	2.02	1.15	2.31	2.04	1.88
22	IET 27755	0.02	16.84	0.03	0.01	4.23	0.094	37.83	0.054	0.025	9.500	2.51	1.93	1.49	2.54	2.12
23	IET 27748	0.03	12.57	0.03	0.02	3.16	0.278	33.05	0.056	0.023	8.352	3.85	1.12	0.89	1.92	1.95
	Mean	**0.03**	**16.56**	**0.03**	**0.02**	**4.16**	**0.104**	**30.63**	**0.069**	**0.046**	**7.713**	**2.50**	**1.43**	**2.16**	**2.73**	**2.20**
	LSD (Treatments)			0.126**					0.686**					0.0312**		
	LSD (Variety)			0.302**					1.647**					0.0746**		
	Treatments x Variety			0.603**					3.294**					0.149**		
	CV (%)			6.88					13.9					3.185		

Table 6.4.20 Physiological characterization of selected rice multiple abiotic stress tolerance on at Faizabad Kharif 2019

S.No.	Entries	% Germination after 7 Days		Grand Mean	% Germination after 14 Days		Grand Mean	Plant Height after 60 DAS		Grand Mean	Plant Dry Weight after 60 DAS		Grand Mean
		Anaerobic germination	Control		Anaerobic germination	Control		Anaerobic germination	Control		Anaerobic germination	Control	
1	AC 1303	19.17	58.33	38.75	41.67	89.17	65.42	38.83	35.67	37.25	60.26	49.73	55.00
2	Rashpanjor	21.67	68.33	45.00	40.00	81.67	60.83	44.00	37.00	40.50	66.45	44.78	55.62
3	Black Gora	15.00	23.33	19.17	20.00	56.67	38.33	39.33	30.83	35.08	42.36	36.44	39.40
4	Parijat	20.00	64.17	42.08	53.33	90.00	71.67	32.50	29.67	31.08	51.38	39.24	45.31
5	Brahman-nakhi	0.00	0.00	0.00	10.83	0.00	5.42	33.83	0.00	16.92	0.00	0.00	0.00
6	AC 3577	0.00	20.83	10.42	15.83	64.17	40.00	33.33	29.50	31.42	46.10	33.01	39.56
7	Mahulata	15.83	45.00	30.42	38.33	90.83	64.58	39.00	32.83	35.92	55.29	47.14	51.21
8	BVD 109	0.00	34.17	17.08	17.50	66.67	42.08	33.00	24.00	28.50	59.48	31.82	45.65
9	IET 27736	18.33	30.00	24.17	21.67	62.50	42.08	35.17	26.33	30.75	53.54	29.51	41.53
10	IET 26861	19.17	61.67	40.42	24.17	93.33	58.75	33.83	27.00	30.42	52.55	41.26	46.90
11	IET 27750	0.00	31.67	15.83	22.50	65.00	43.75	31.83	23.50	27.67	55.89	28.53	42.21
12	IET 27773	18.33	49.17	33.75	30.00	90.00	60.00	33.33	26.00	29.67	57.37	37.61	47.49
13	IET 27772	19.17	34.17	26.67	28.33	57.50	42.92	29.83	24.67	27.25	77.59	39.47	58.53
14	IET 27768	15.83	78.33	47.08	42.50	100.00	71.25	34.83	26.00	30.42	51.60	41.22	46.41
15	IET 27762	17.50	60.83	39.17	32.50	78.33	55.42	33.00	24.83	28.92	102.83	41.24	72.04
16	IET 27758	0.00	14.17	7.08	0.00	14.17	7.08	0.00	23.17	11.58	0.00	21.89	10.94
17	IET 27737	0.00	16.67	8.33	0.00	26.67	13.33	0.00	26.83	13.42	0.00	23.89	11.95
18	IET 27775	0.00	38.33	19.17	14.17	79.17	46.67	37.33	30.17	33.75	87.42	62.22	74.82
19	IET 27356	17.50	75.00	46.25	50.00	93.33	71.67	38.83	31.00	34.92	79.39	58.74	69.07
20	IET 27757	0.00	14.17	7.08	10.83	14.17	12.50	32.83	30.33	31.58	124.97	53.69	89.33
21	IET 26961	12.50	40.00	26.25	21.67	70.00	45.83	31.83	30.50	31.17	43.08	57.45	50.27
22	IET 27755	20.00	60.00	40.00	35.00	98.33	66.67	32.17	33.67	32.92	115.31	64.76	90.04
23	IET 27748	16.67	61.67	39.17	25.83	90.00	57.92	34.83	31.83	33.33	121.30	64.92	93.11
	Mean	**11.59**	**42.61**	**27.10**	**25.94**	**68.33**	**47.14**	**31.89**	**27.62**	**29.76**	**61.05**	**41.24**	**51.15**
	LSD (Treatments)		4.43**		4.523**				1.00**		0.602**		
	LSD (Variety)		15.01**		15.341**				3.423**		2.044**		
	Treatments x Variety		21.23**		21.695**				4.84**		2.890**		
	CV (%)		36.4		21.56				7.5		2.63		

6.5. Screening for submergence tolerance in Rice

Locations: NRRI, CBT, TTB and FZB

Waterlogging and floods cause substantial yield losses in cereal crops worldwide, aggravating poverty and food insecurity in developing countries. Climate change scenarios are predicting increases in future incidences and intensities of floods, especially in the tropics and subtropics Most dryland cereals, such as maize, wheat, and barley, are sensitive to water logging, causing up to 20% yield losses in irrigated areas, and even greater losses in rainfed ecos systems exceeding 40%. Water logging hampers root growth and function because of oxygen shortages that restrict root respiration. Climate change scenarios are predicting increases in future incidences and intensities of floods, especially in the tropics and subtropics. Complete submergence during seedling stage due to flooding can affect rice growth and yield in more than 16 million ha of deep-water rice areas throughout the world resulting in substantial economic losses to the farmers. Cultivars such as FR13A, are highly tolerant and survive up to two weeks of complete submergence owing to a major quantitative trait locus designated *Submergence 1* (*Sub1).* Keeping this in view, during Kharif 2019, a trial was formulated to evaluate promising rice genotypes for submergence tolerance.

At CBT centre the survival of rice seedlings were studied after 14 days of total submergence. The plant height was measured before and after submergence and % elongation was estimated. The results on % elongation was presented (Fig.6.5.1). The mean % elongation for all the tested genotypes is 10.6%. Significant variation was observed in % elongation amongst the genotypes. Maximum elongation was observed in AC38675 followed by PAU 9, Sabita and Rahaman Nakhi.

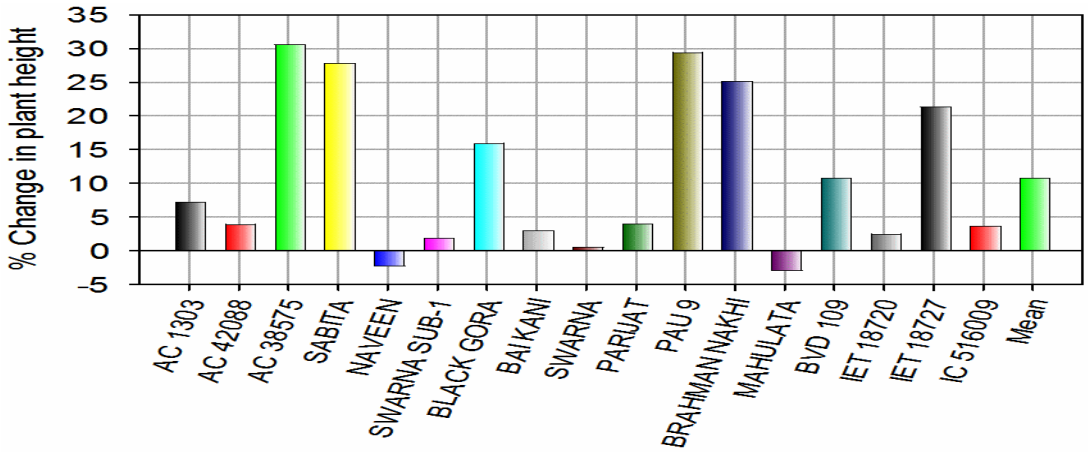


Fig. 6.5.1: Influence of submergence on the % elongation in plant height in different rice genotypes during Kharif-2019.

Elongation was minimum in geotypes AC 1303, AC 42088,Naveen, Swarna-sub1, Bakani, Swapna, PARUAT, IET 18720 and IET 18727. Survival percentage of plants after submergence was measured. The data revealed that the mean survival % for all the tested genotypes is 55.7% and the survival % varied from a maximum of 91% (IC516009) to 31% (BVD 109) followed by IET18720 (Fig. 6.5.2).

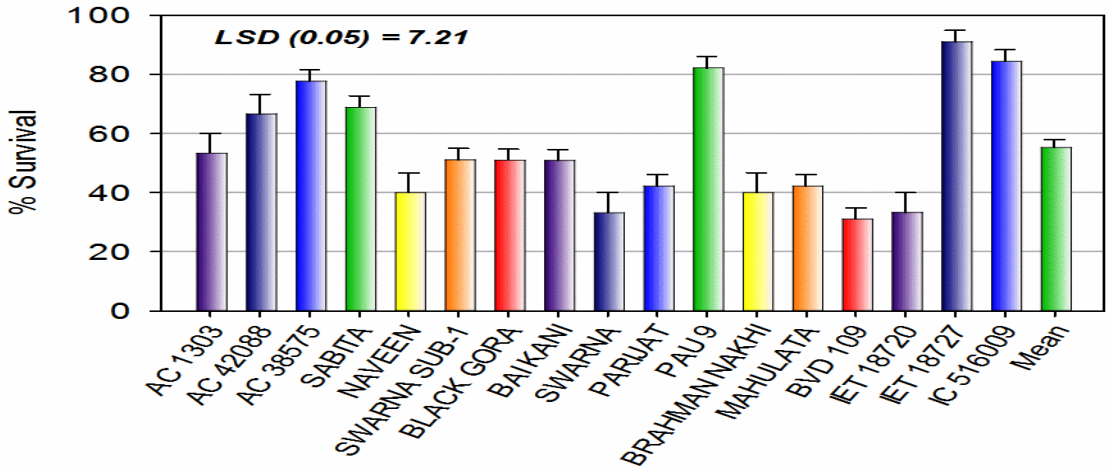


Fig.6.5.2: Influence of total submergence on the plant survival in different rice genotypes. Each bar represents the mean of 3 replications.

Total starch content was estimated in the leaves and the data revealed that significant differences were noticed amongst the rice genotypes,. The starch content varies between 6.58 mg/g (PAU9) to 2.49 mg/g (BVD 109) followed by IET 18720 and Swarna (Fig. 6.5.3) with a mean value of 4.42 mg/g.

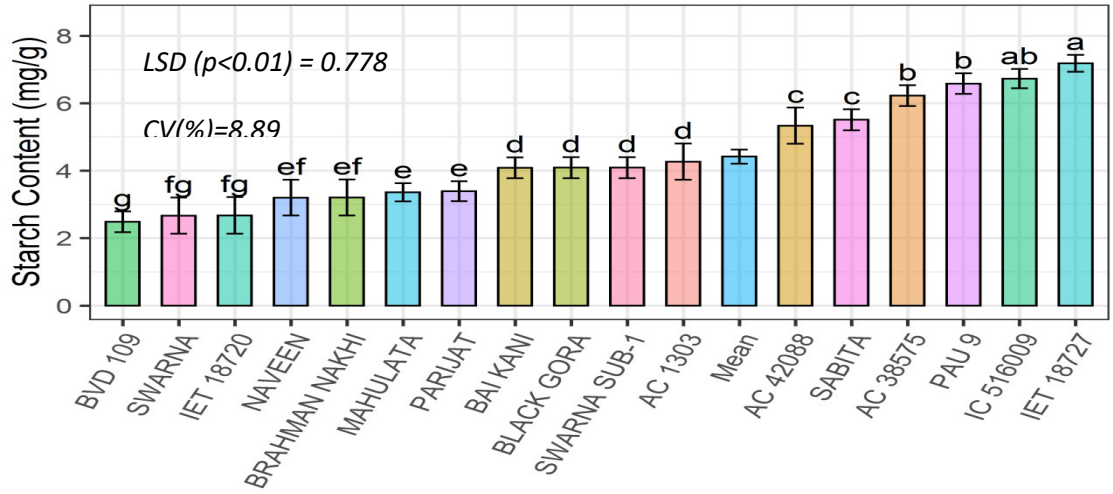


Fig.6.5.3 Influence of submergence on leaf starch content in different rice genotypes. Each bar represents the mean of three replications ±SDev. Bars with same letter are statistically not different.

At PTB centre plant height was measured before and after submergence and the elongation % was calculated. The mean (mean of all genotypes) % elongation was >37%. Significant ($p<0.05$) differences were observed in the % elongation between the tested genotypes. The % elongation ranged from 56% (SBITA) and Brahman Nakhi (54%) to a minimum of 21.2% (Mahulata) and BVD 109 (22.6%) (Fig.6.5.4)

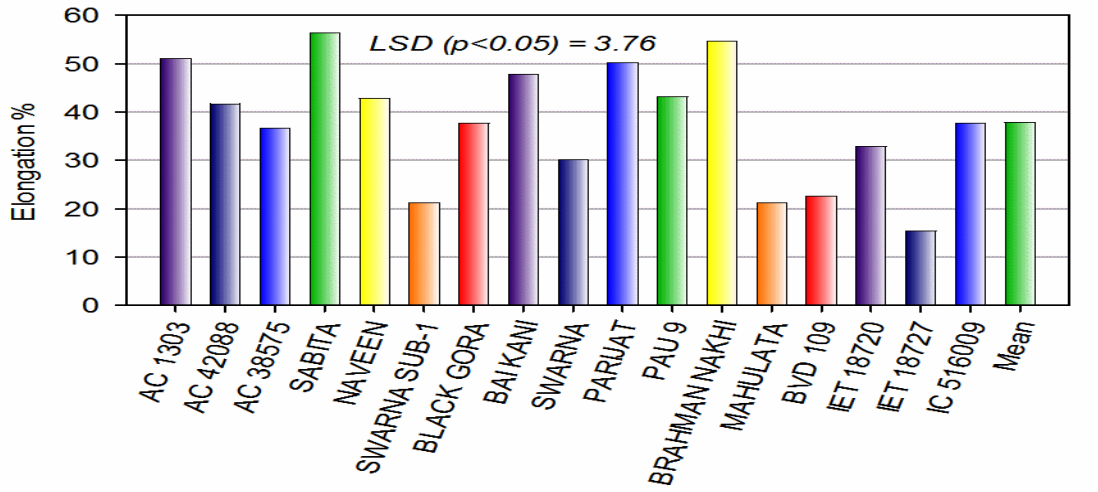


Fig.6.5.4: Influence of submergence on the % elongation in seedlings of different rice genotypes during kharif-2019 season at PTB centre

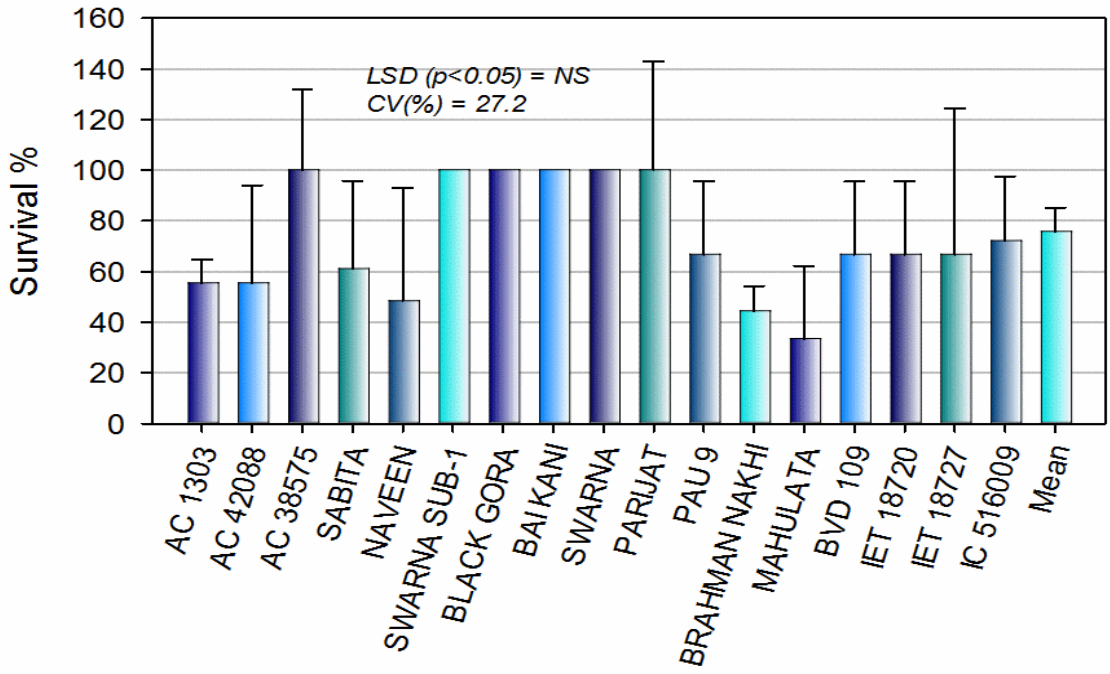


Fig.6.5.4: influence of submergence on seedling survival in different rice genotypes at PTB centre during kharif-2019. Each bar represents the mean of 3 replications ± Stdev.

Seedling survival after submergence stress was measured. The mean seedling survival % was 75%. However, the differences between the genotypes was statistically non-significant. Swarna sub-1, Black Gora, Bakani, Swarna, AC38575 and Pariji did not suffered any seedling mortality. The seedling survival is lowest in Mahulata, Pau-9 and Brahman Nakhi which is >50% *(Fig.6.5.4).*

At FZB centre none of the plants survived after submergence. Hence no data was available regarding elongation rate or seedling survival.

At TTB centre seedling survival was measured after submergence. The data revealed that the mean (mean of all genotypes) was >35% and the differences between the genotypes was found to be significant ($p<0.01$). The percent survival of the seedlings was highest in AC Sabita followed by AC38575, AC42088 and Madhulata, these show better survival percentage than the Swarna sub1. The survival percentage is lowest in swarna, BVD 19, PAU-9 and Naveen *(Fig.6.5.5).*

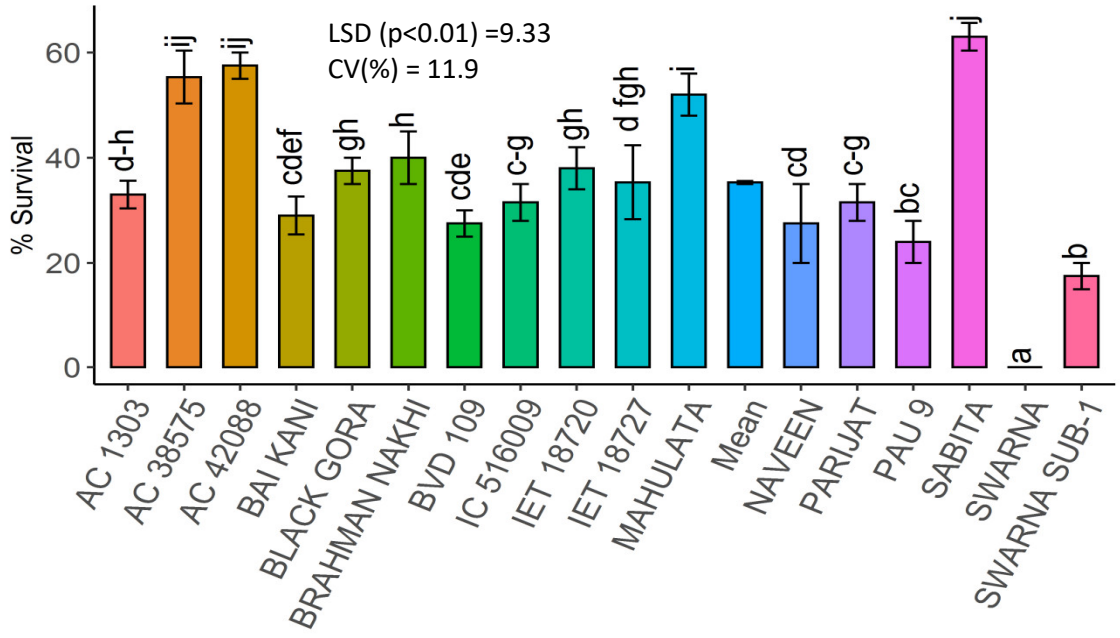


Fig.6.5.5: Influence of submergence on seedling survival percent in different rice varieties. Each bar represents the mean of 3 replications ± SDdev. Bars with similar letters are statistically non-significant.

At NRRI centre seedling survival after submergence was measured and the data was presented in Fig.6.5.6A. The data revealed that the mean % survival is 23.7% for all the tested genotypes. Significant ($p<0.01$) genotypic differences were observed between the

genotypes. AC42088 show maximum survival percentage (98%) followed by Sabita (61%) Swarna Sub-1 (61%) andIC516009 (<58%). As many as 7 genotypes did not survived the submergence treatment *(Fig.6.5.7A).*

Starch content was estimated and the data was depicted in *Fig.6.5.7.B*. The starch content for all the genotypes was 38 mg/g dry weight. Significant variation was observed amongst the genotypes for starch content. Maximum starch content was observed in IC42088 (94.7 mg/g) followed by AC1303(60.8 mg/g). Lowest starch content was recorded in BVD 109 (13 mg/g) Parijat (14 mg/g), Brahman Nakhi (14 mg/g), Black Gora (16 mg/g). In fact as many as 7 genotypes recorded lower starch content than the mean starch content of all the genotypes.

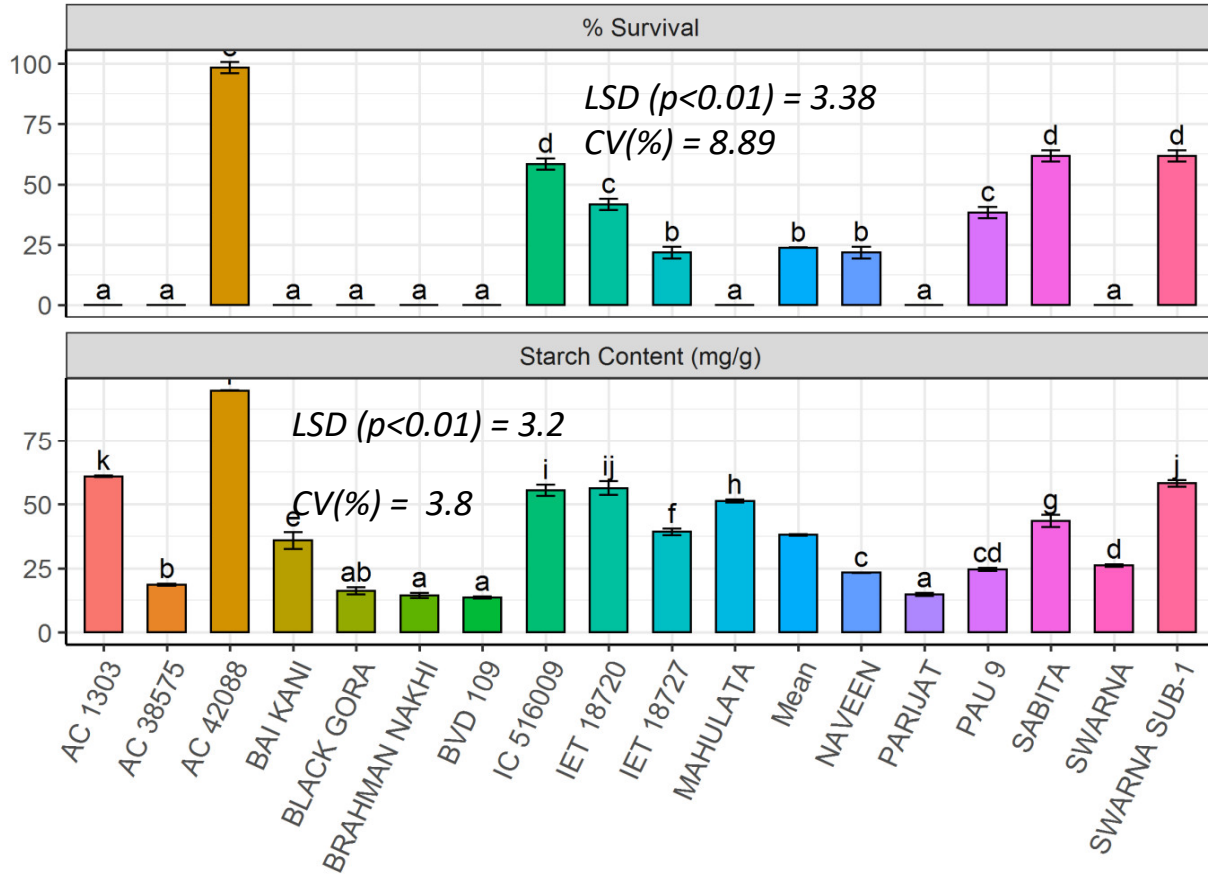


Fig.6.5.6: influence of submergence on seedling survival % and starch content (mg/g) in different rice genotypes. Each bar represents the mean of 3 replications±Stdev. Bars with same letter are statistically not different.

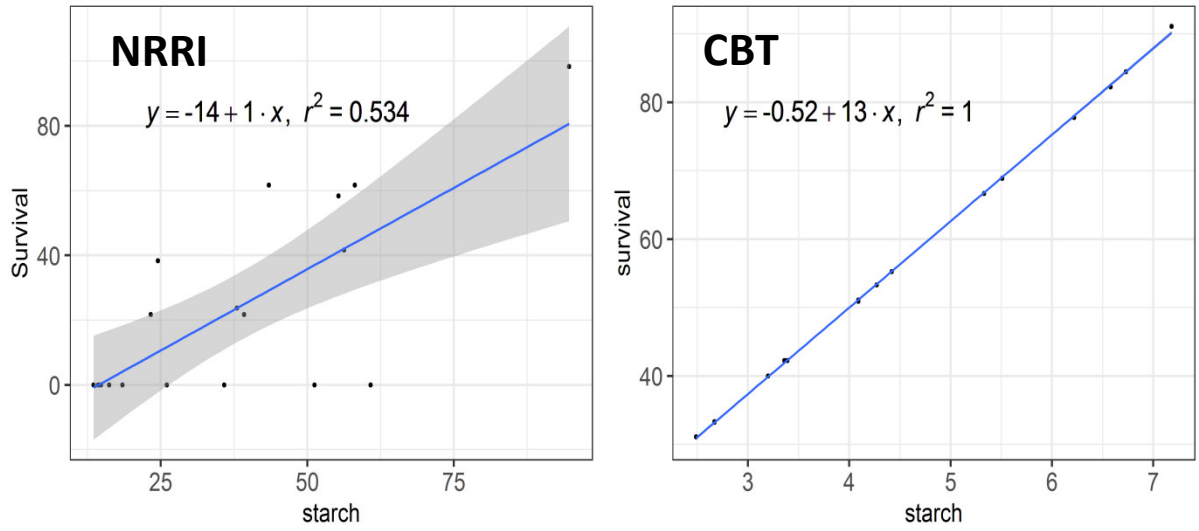


Fig.6.5.7: Relationship between leaf starch content before submergence and seedling survival percent in different rice genotypes. Mean of all genotypes were used to compute the relationship between the two traits.

Leaf starch content show highly significant relation with seedling survival percentage after submerance. The relationship was highly significant at both NRRI and CBT centres. The data indicate that seedling survival dependent on leaf starch content.

Summary & Conclusion

During Kharif 2019, a trial was formulated to evaluate promising rice genotypes for submergence tolerance. Seventeen different rice genotypes were included in the trial which was conducted at four AICRIP centres (NRRI, PTB, FZ B and TTB). Submergence tolerance was estimated by survival percentage of the seedlings subjected to complete submergence. The survival percentage was relatively higher in AC42088 Sabita followed by AC38575, AC42088 and Madhulata, these show better survival percentage than the Swarna sub1 at TTB centre. Similarly, at NRRI AC42088 show maximum survival percentage (98%) followed by Sabita (61%) Swarna Sub-1 (61%) andIC516009 (<58%). As many as 7 genotypes did not survived the submergence treatment. Significant differences were noticed in starch content among the genotypes. A significant positive association was observed between the leaf starch content and % survival indicating that leaf starch content is very important in seedling survival during submergence.

6.6 Screening of elite rice germplasm for low light stress tolerance

Locations: IIRR, CHN, KJT, NRRI, MTU, PNR and RPR

It was considered that low light intensity during monsoon season was an important constraint for higher productivity since yields as low as 3.2 to 4.4 tons/ha were recorded with varieties which yielded 8 to 10 tons/ha under high light intensity conditions as in rabi. The yield of field-grown rice mainly depends on the solar radiation throughout the growth period, especially during the reproductive and/or grain filling stages. Low irradiance (LI) during the reproductive and/or ripening stages has an adverse effect on potential yield because the photosynthetic activity in the leaves of rice cultivars decreases In addition, rice plants in low irradiance environments have shown physiological responses such as: changes in chlorophyll and rubisco content . In view of the importance of low light tolerance in rice crop a new trial was proposed during 51st ACRIP meeting at Raipur and is being continued since then. During Kharif 2019 season the trial was conducted at 7 AICRIP centres with 18 genotypes including 16 taken from IVT-SDW trial. Swarnaprabha was included as tolerant check and IR-8 was taken as susceptible check. Low light treatments were imposed immediately after transplanting by enclosing the plots in shade-net (50% transmittance). The shade net was supported by metal/bamboo poles. The trial was conducted using Factorial RBD design with light treatment as first factor and genotypes as second factor with three replications.

Low-light stress does not significantly alter the days to flowering (DF) and days to physiological maturity (DM). The mean DF (mean of genotypes and locations) under ambient control is 110 days which became 112 days under low-light condition *(Table 6.6.1).* The mean DF was maximum at IRR followed by PNR. The mean DF was lowest at RPR and the difference between ambient control and low-light treatment was discernable at TTB centre. Similarly, the days to maturity show no significant differences between the treatment. The mean DM was 131 days under control and 127 days under low-light stress treatment. The crop at IIRR took maximum number of days to attain physiological maturity where as at RPR the crop took minimum number of days (*Fig. 6.6.1*). Significant differences were observed amongst the genotypes for both DF and DM.

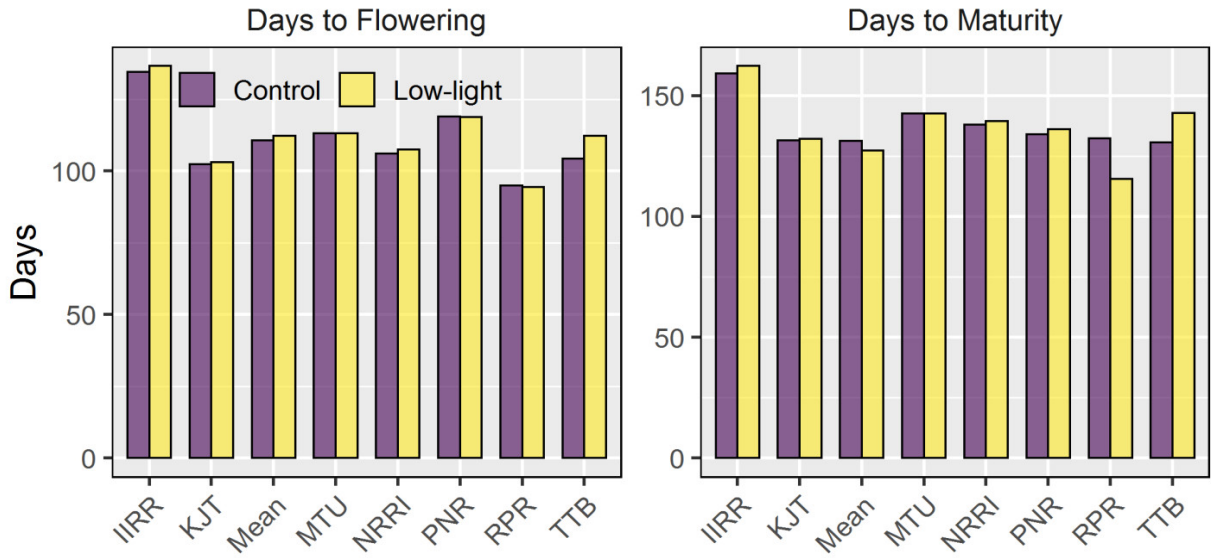


Fig.6.6.1: Influence of Low-light stress on Days to flowering and Days to maturity in different rice genotypes during kharif-2019 at different AICRIP locations. Each bar represents the mean of all genotypes & 3 replications.

The mean DF (mean of treatments & locations) varied between a maximum of 117 days (IET 27572) followed by IR-8 (116 days) to a minimum of 86 days (IET 26687). Similarly, the mean DM varied between a maximum of 147 days (IET 27588) to a minimum of 121 days(IET 27597 and IET 27572) *(Fig. 6.6.1)*.

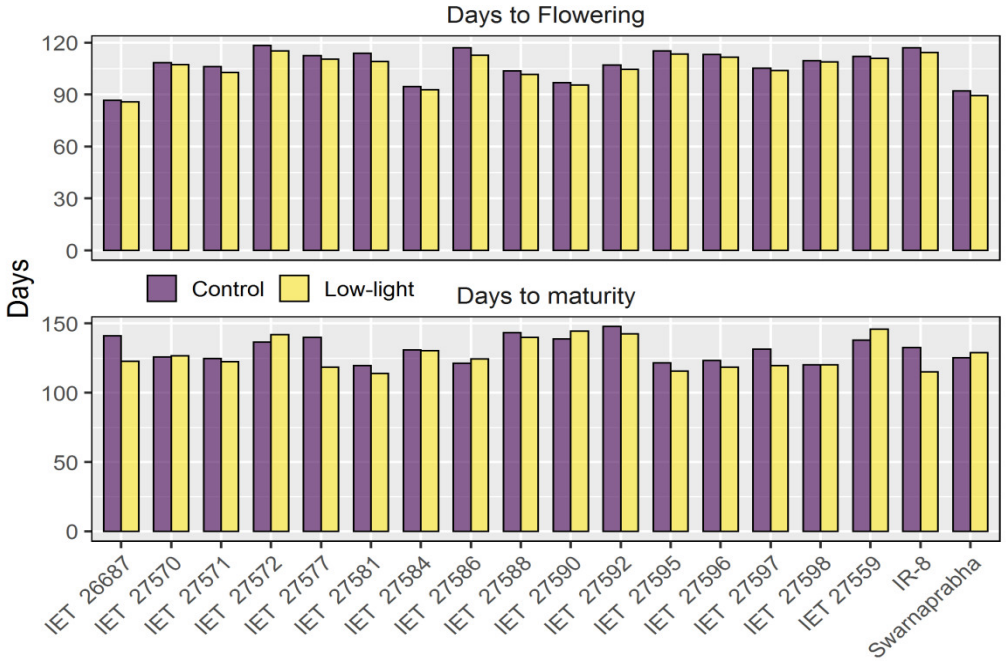


Fig.6.6.2: Influence of Low-light stress on Days to flowering and Days to maturity in different rice genotypes during kharif-2019 at different AICRIP locations. Each bar represents the mean of all locations & 3 replications

The mean (mean of all genotypes and locations)Plant height was not significantly influenced by the light treatments.(*Table 6.6.3).* However, a significant ($p<0.01$) interaction between Genotype x Location was observed implying that the genotypes behaved differently at different locations. Furthermore, the interaction between Genotype x Treatment was also found to be significant, indicating that the genotypes behaved differently under different treatments (Table 6.6.3). The plant height was marginally increased under low-light condition. Maximum increase in plant height under low-light treatment was observed at PNR centre which is very significant. The increase in mean plant height was <8% at all other centres. In fact, a non-significant increase in mean plant height was observed at MTU and RPR centres and at TTB no change was noticed in mean plant height under low-light condition. (*Fig. 6.6.3A*). Significant differences were observed amongst the genotypes. The mean (mean of all locations) show maximum increase in case of IET 27559 and IET 27590 and in case of IET 26687 non change was noticed in mean plant height. In IET 27581 and IR-8 a marginal reduction in plant height was observed *(Fig.6.6.3B).*

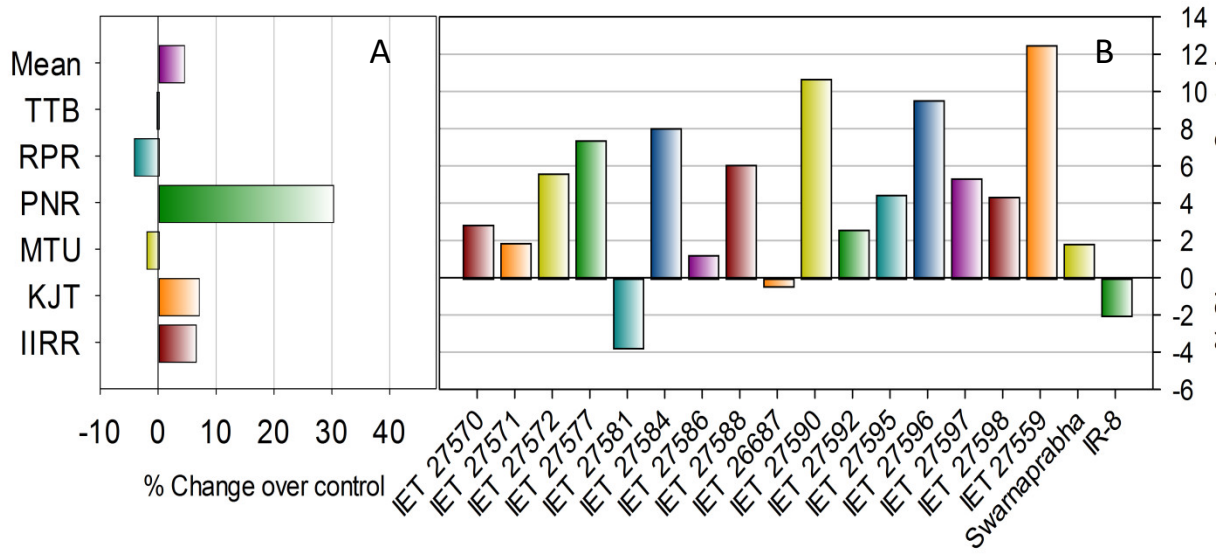


Fig. 6.6.3 : Influence of low-light on plant height in different rice genotypes at different AICRIP centres. (A) mean of all genotypes (B) mean lf all genotypes.

The data on stem weight at flowering stage was presented in *Table 6.6.5.* The data revealed that low light stress show significant effect on mean (mean of all locations and genotypes). The stem weight was reduced by > 32% under low-light in comparison with ambient control (Fig. 6.6.4). The interaction between Genotype x Location was found to be significant ($p<0.01$) indicating that the genotypes behaved differently across the locations. The reduction in mean stem weight is maximum at RPR centre followed by NRRI and PNR

centres. Minimum reduction was observed at KJT and TTB centers (*Fig.6.6.4A).* Significant differences were observed between the genotypes as revealed by highly significant interaction between Treatment x Genotype. Maximum reduction in mean stem weight was observed in case of swarnaprabha followed by IET 26687 and IET 27570. Minimum reduction was noticed in IET 27572, IET 27571 and IET 27596 (*Fig.6.6.4B)*

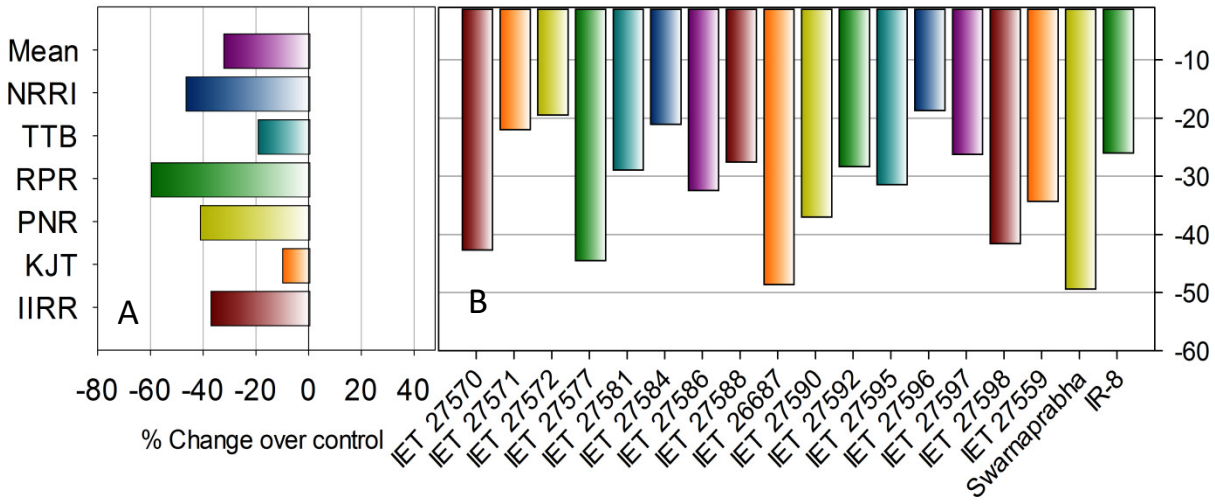


Fig. 6.6.4 : Influence of low-light on stem weight of different rice genotypes at different AICRIP centres. (A) mean of all genotypes (B) mean lf all genotypes.

Leaf chlorophyll content was estimated with the help of SPAD meter. The data indicated that light regimes had significant ($p<0.01$) effect on SPAD readings *(Fig.6.6.5).* The mean Chlorophyll (SPAD) content was increased under low-light treatment by >11% in comparison with ambient control. Significant ($p<0.01$) differences were observed in mean SPAD amongst the genotypes. Maximum content SPAD reading was observed in Swarnaprabha followed by IET 27597, IET 27595, IET 27590 and IET 27584. Significant interaction was observed between Genotype x Treatment implying that the significant differences existed amongst the genotypes in their response to low-light treatment.

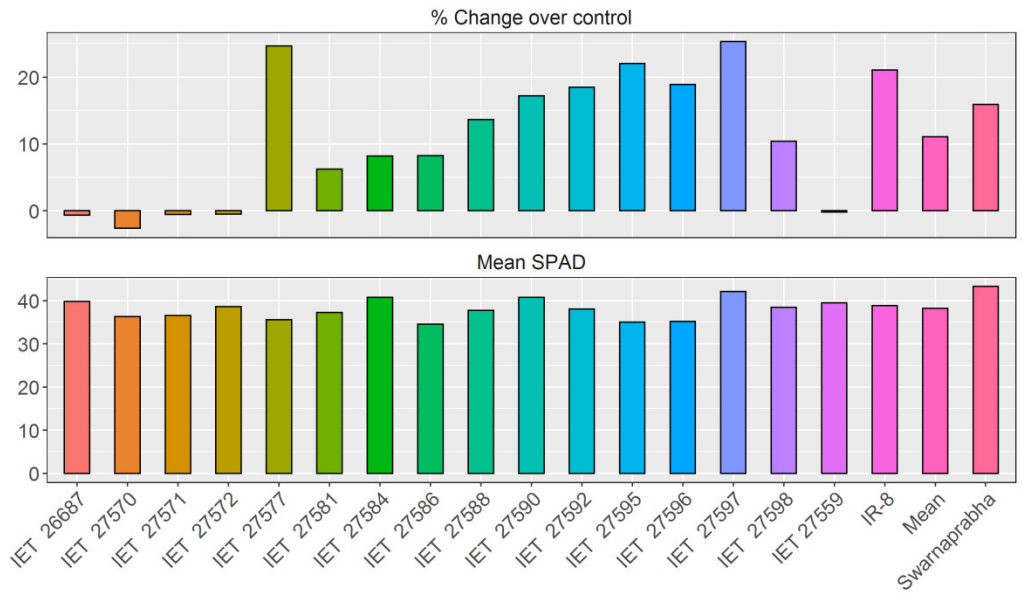


Fig.6.6.5 Influence of low-light stress on leaf chlorophyll (SPAD) content in different rice genotypes during kharif-2019 season. (A) % Change under Low-light stress in comparison with control (B) Mean chlorophyll (SPAD) content (mean of all treatments).

At NRRI, PNR and TTB centres leaf chlorophyll content was measured at panicle initiation stage and again at flowering stage. The total chlorophyll content was significantly affected by low-light treatment at both the stages *(Table 6.6.6 & 6.6.7)*. Low-light treatment increased the leaf chlorophyll content by >14% and >9% , respectively in comparison with control treatment. At PI and flowering stages the differences amongst the genotypes was non-significant for mean chlorophyll content. Moreover, the interaction between Location x treatment was found to be non-significant for both the stages (Table 6.6.6). Similarly, the interaction between Location x Genotype was also non-significant, implying that the treatment effect on chlorophyll content did not differed among the locations. However, a strong interaction was observed between Genotype x Treatment (Table 6.6.6). In all genotypes chlorophyll content increased under low-light stress. However, in some entries like IET 27577 a significant reduction in chlorophyll content was noticed. In IET 27581 and IET 27592 the reduction in chlorophyll was negligible at PI stage. Maximum increase in chlorophyll content was recorded in IET 27597 in both the stages studied (*Fig.6.6.6)* followed by IET27550.

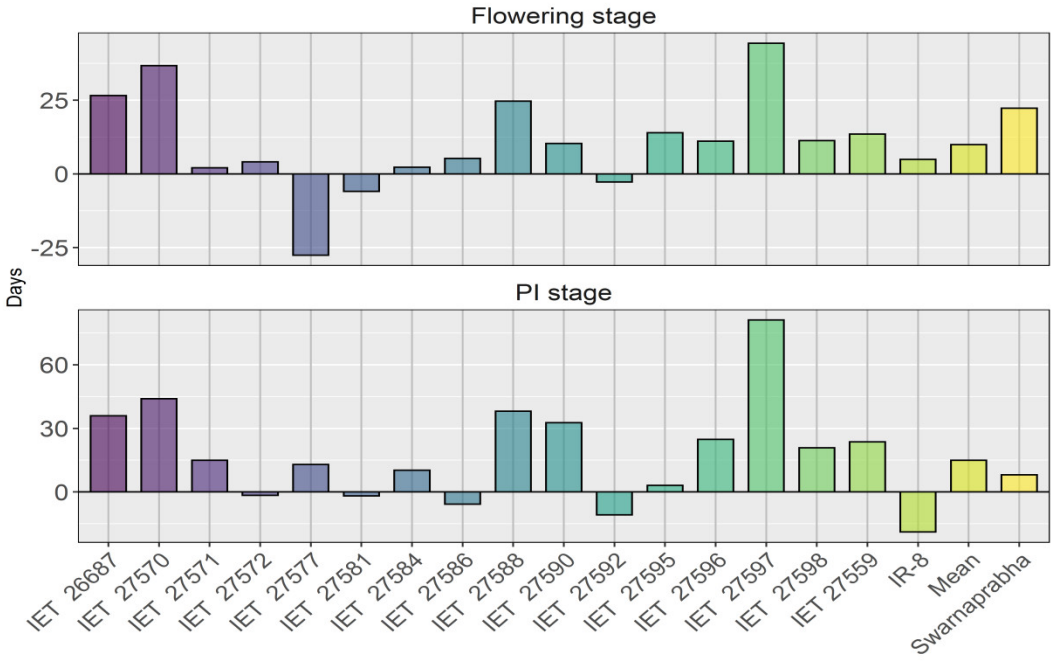


Fig. 6.6.6: Influence of Low-light stress on leaf total chlorophyll content indifferent rice genotypes. Each bar represent % change in chlorophyll content under Low-light in comparison with ambient control condition.

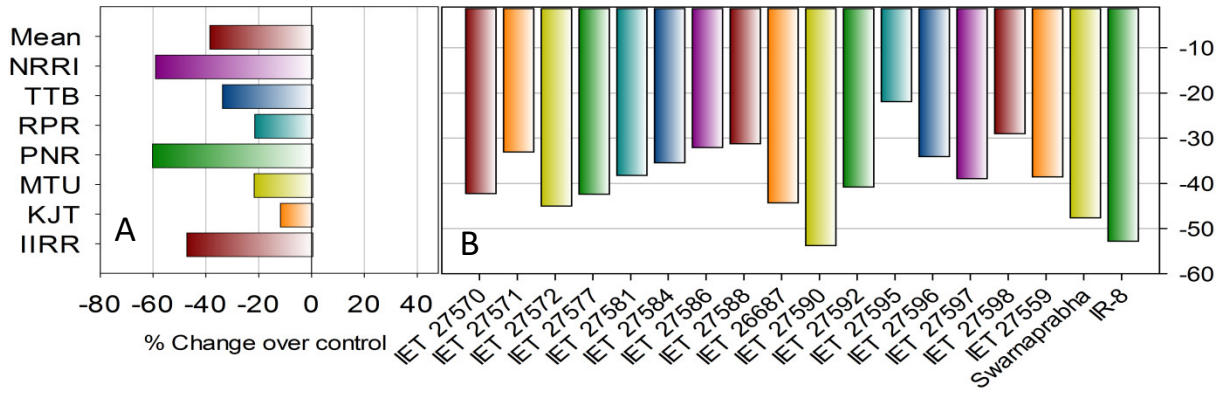


Fig. 6.6.7 : Influence of low-light on Panicle weight m^{-2} of different rice genotypes at different AICRIP centres. (A) mean of all genotypes (B) mean lf all genotypes.

Panicle weight m^{-2} recorded at maturity is an important yield contributing trait which was significantly affected by the light regime (*Table 6.6.11)*. The mean (mean of all genotypes and locations) show significant ($p<0.05$) reduction (>38% over control) under low-light condition. The interaction between Treatment x Location was found to be highly significant ($p<0.01$) indicating that the treatment effect differs across locations. Maximum reduction under low-light was observed at PNR and NRRI centres followed by IIRR which is

higher than the over all mean for all locations *(Fig.6.6.7A).* The reduction is less in case of KJT, MTU and RPR centres. Significant differences were observed between the genotypes and in their response to different light regimes as indicated by highly significant interaction between Treatment x Genotype *(Table 6.6.11).* Low-light reduced the panicle weight in all the genotypes. Maximum reduction was observed in IET 27590 and IR-8. The reduction is lowest in IET 27595, IET 27571, IET 27598 *(Fig.6.6.7B).*

Number of grain per panicle is one of the important yield attribute which was measured after harvest. Low-light stress treatment had resulted in >32% reduction in Grain No. Panicle^{-1} (GNo) in comparison with control treatment (Fig. 6.6.8A). Results of ANOVA indicated that a significant interaction between Location x Treatment was found to be highly significant ($p<0.01$), implying that the treatment effect is not uniform across the locations (*Table 6.6.12).* Maximum reduction in grain number was observed at

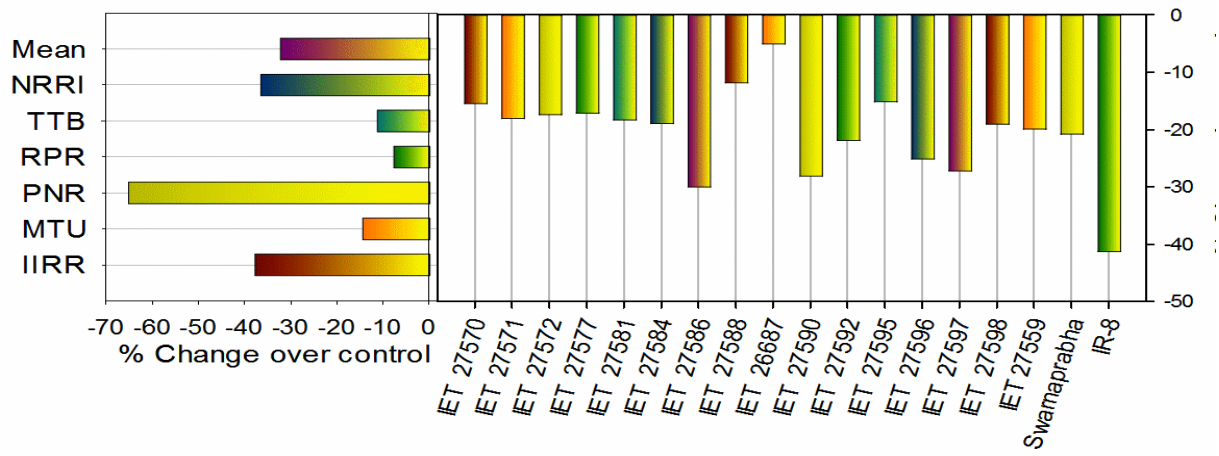


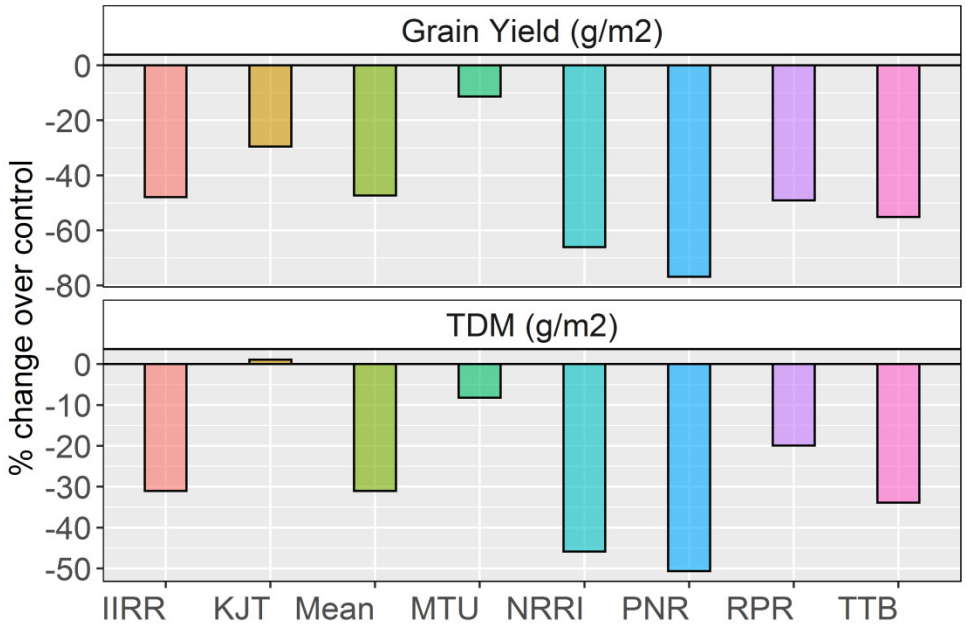
Fig.6.6.8: Influence of low-light stress on grain No.Panicle^{-2} in different rice genotypes at different AICRIP locations. (A) Mean of all genotypes (B) Mean of all locations.

PNR centre followed by IIRR. Minimum reduction in grain number per panicle in RPR and TTB centres. The differences amongst the genotypes was non-significant. Maximum reduction in number of grains was observed in iR-8 (>38%). Minimum reduction in grain number was observed in IET26687 followed by IET 27588 and IET 27570 which is less than the reduction in Swarnaprabha, which is low-light tolerant.*(Fig.6.6.8B).*

Table *6.6.13* presents the data on effect of low light stress on spikelet No per panicle. The data revealed that the mean spikelet number was not significantly influenced by the low light treatment. However, the interaction between location x treatment was found to be

significant. Maximum reduction in spikelet number was observed at IIRR followed by NRRI and minimum change was observed at PNR centre. The interaction between Location x Genotype was found to be significant ($p<0.01$). With the exception of Swarnaprabha, IET 27596, IET 27592 and IET 27598, all other tested entries recorded reduction in spikelet number under low light. Maximum reduction was observed in IET 27595 followed by IET 27577 and IR-8 (*Table 6.6.13).*

Low-light treatment resulted in significant reduction in the 1000 grain weight (test weight). The mean test weight (mean of all locations and genotypes) recorded >20% reduction under low-light in comparison with control treatment (*Table 6.6.18).* significant interaction ($p<0.01$) was observed between Location x Treatment implying that the effect of imposed treatment varied from location to location. Maximum reduction in test weight as observed at PNR followed by RPR centers. The reduction is relatively lower at NRRI and IIRR centres. The differences in mean test weight amongst the varieties is non-significant. However, highly significant ($p<0.01$) interaction between Location x Genotype was observed indicating that the genotypes behaved differently at different locations. With the exception of IET 26687, all other tested entries recorded reduction in test weight (*Table 6.6.18).*



6.6.9: Influence of low-light stress on TDM and Grain Yield at different locations during kharif 2019 season. Each bar represent % change in mean TDM in comparison with control treatment.

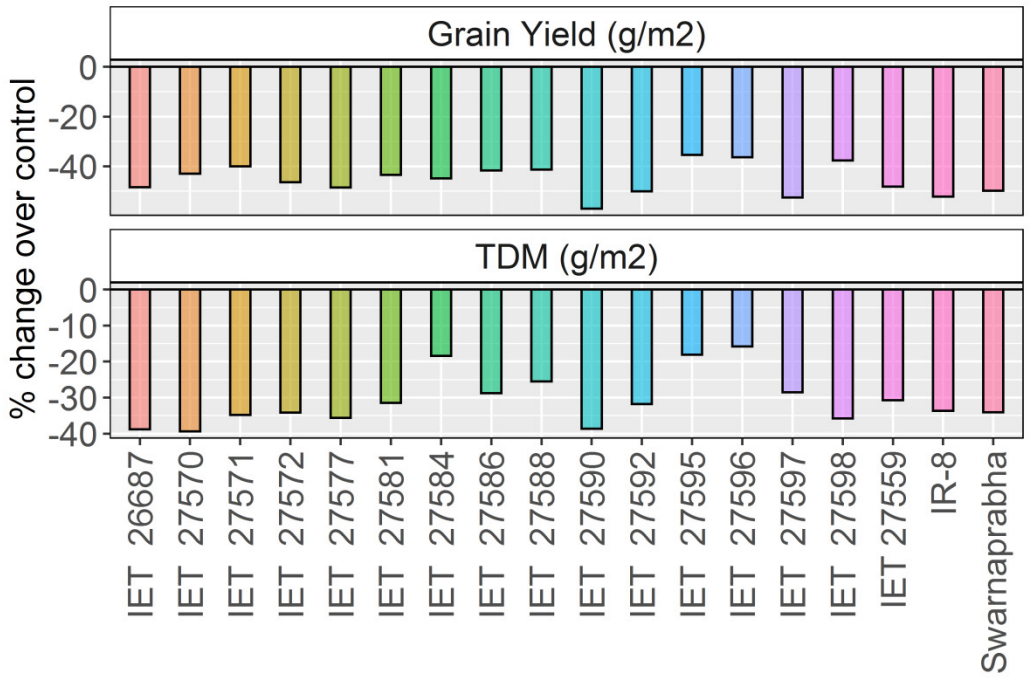


Fig.6.6.10: Influence of low-light stress on TDM and Grain yield in different rice varieties. Each bar represents the % change in comparison with control and mean of all locations.

The mean TDM (mean of all locations and genotypes) was significantly ($p<0.01$) reduced by low-light treatment. The mean TDM was reduced by >31% under low-light condition in comparison with control condition *(Fig. 6.6.10)*. Similarly, grain yield was also significantly affected by low-light treatment. The mean grain yield (mean of all genotypes and locations) was reduced by >47% in comparison with control treatment. Significant differences were observed amongst the locations for mean TDM. Maximum reduction in mean TDM was observed at PNR followed by NRRI. Minimum reduction in mean TDM was observed at KJT centre. Similarly, significant differences were observed amongst the locations for mean grain yield Maximum reduction in mean grain yield. Maximum reduction was observed at PNR centre followed by NRRI and minimum reduction in grain yield was observed at MTU centre *(Fig. 6.6.10)*.

Low-light conditions reduced the TDM and grain yield in all the genotypes. The interaction between Treatment x Genotype was found to be non-significant for both TDM and grain yield. All the genotypes including the tolerant check Swarnaprabha recorded significant reduction in both TDM and grain yield. Maximum reduction is observed in IET 27570 (39% reduction) followed by IET27577. Similarly, The reduction in grain yield was highest in IET27590 followed by IET27597 and IET27592. The reduction is >40% in all the

remaining entries with the exception of IET27595, IET275995 and IET27596 in which the reduction is <40%. These entries may be considered as relatively tolerant to low-light as the yield loss in these entries is less than the tolerant check swarnaprabha.

Data pertaining to the effect of low-light on harvest index (HI) was presented in *Table 6.6.19.* The data revealed that low-light stress significantly reduced the mean HI (mean of all genotypes and locations) by >20% in comparison with control treatment . The reduction in HI varied amongst the locations. Maximum reduction was observed at TTB followed by NRRI and minimum reduction was observed at KJT and MTU centres. The reduction in mean HI under low-light stress was maximum in IET 27584 and relatively lower reduction in observed in IET 27571 and IET 27598 (*Table 6.6.19).*

Summary & Conclusion

A trial was conducted at 7 AICRIP centres with 18 genotypes including 16 taken from IVT-SDW trial. Swarnaprabha was included as tolerant check and IR-8 was taken as susceptible check. Low light treatments were imposed immediately after transplanting by enclosing the plots in shade-net (50% transmittance). The shade net was supported by metal/bamboo poles. Low-light stress did not significantly influenced the days to flowering and days to maturity. Significant increase in leaf chlorophyll content was observed in all genotypes under low-light. Low-light treatment significantly influenced many yield contributing traits and reduced grain yield substantially. The reduction in grain yield was highest in IET27590 followed by IET27597 and IET27592. The reduction is >40% in all the remaining entries with the exception of IET27595, IET275995 and IET27596 in which the reduction is <40%. These entries may be considered as relatively tolerant to low-light as the yield loss in these entries is less than the tolerant check swarnaprabha.

Table 6.6.1 Influence of Low-Light Stress on Days to flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	145	114	121	138	109	123	100	121	146	114	121	124	103	130	99	120
2	IET 27571	143	114	121	137	98	121	100	119	144	114	118	121	98	129	100	118
3	IET 27572	128	105	106	111	91	90	108	106	130	108	104	111	91	98	117	109
4	IET 27577	137	93	121	110	97	103	113	111	139	93	122	113	97	110	115	113
5	IET 27581	143	90	116	114	105	117	100	112	144	90	118	118	103	125	100	114
6	IET 27584	119	90	116	92	80	81	87	95	120	90	116	106	80	89	87	98
7	IET 27586	137	90	116	139	98	115	119	116	139	92	116	130	98	122	118	116
8	IET 27588	136	105	110	116	98	113	119	114	138	108	111	113	98	121	117	115
9	IET 26687	137	105	110	114	98	103	115	112	139	107	109	130	98	112	113	115
10	IET 27590	137	104	116	123	98	84	115	111	139	108	115	133	98	93	117	115
11	IET 27592	137	114	117	135	105	113	119	120	139	114	119	119	98	122	119	119
12	IET 27595	136	105	98	122	95	113	119	113	138	105	99	117	98	123	116	114
13	IET 27596	136	114	118	138	98	116	100	117	138	114	121	132	98	125	100	118
14	IET 27597	118	90	117	104	80	90	99	100	127	90	119	117	80	96	113	106
15	IET 27598	145	114	116	138	105	123	99	120	145	114	118	125	106	130	99	120
16	IET 27559	137	105	112	114	95	91	109	109	139	105	112	114	97	99	117	112
17	Swarnaprabha	116	90	100	91	73	90	87	92	118	90	98	98	73	99	93	96
18	IR-8	133	100	104	104	85	90	103	103	134	100	103	115	85	98	93	104
	Mean	**134**	**102**	**113**	**119**	**95**	**104**	**106**	**111**	**137**	**103**	**113**	**119**	**94**	**112**	**107**	**112**
	LSD (Treatment)				NS					LSD (Treatment x Genotype)					NS		
	LSD (Location x Treatment)				1.46**					LSD (Location x Treatment x Genotype)					NS		
	LSD (Genotype)				1.781**					CV (%)					2.63		
	LSD (Location x Genotype)				4.40**												

Table 6.6.2 Influence of Low-Light Stress on Days to maturity in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	161	143	150	0	143	148	135	126	165	143	150	0	144	155	130	127
2	IET 27571	161	144	150	0	137	149	132	125	164	144	147	0	113	157	132	122
3	IET 27572	158	136	136	141	126	119	140	137	160	139	134	152	131	128	150	142
4	IET 27577	158	123	150	142	131	131	145	140	161	123	151	0	107	140	148	118
5	IET 27581	161	118	146	0	137	144	131	120	163	118	147	0	82	157	131	114
6	IET 27584	158	117	145	126	142	109	119	131	162	117	146	129	116	124	119	130
7	IET 27586	160	118	146	0	133	142	150	121	165	120	145	0	137	154	150	124
8	IET 27588	160	134	140	142	136	141	150	143	163	137	142	152	82	153	150	140
9	IET 26687	158	135	139	145	131	131	149	141	161	137	138	0	137	140	145	123
10	IET 27590	158	133	145	145	131	113	148	139	163	137	144	155	137	126	150	145
11	IET 27592	161	142	146	157	137	142	150	148	165	142	148	157	82	153	150	142
12	IET 27595	161	134	128	0	136	142	150	121	165	134	128	0	82	154	148	116
13	IET 27596	160	144	148	0	136	143	132	123	166	144	150	0	82	155	132	119
14	IET 27597	158	118	146	129	123	117	130	132	159	118	149	0	139	127	145	120
15	IET 27598	160	143	145	0	142	120	131	120	158	143	148	0	132	129	131	120
16	IET 27559	158	135	142	145	126	120	140	138	161	135	141	145	131	158	150	146
17	Swarnaprabha	158	120	129	126	107	119	118	125	159	120	127	131	112	129	125	129
18	IR-8	158	128	134	128	126	120	135	133	159	128	132	0	131	132	125	115
	Mean	**159**	**131**	**143**	**85**	**132**	**131**	**138**	**131**	**162**	**132**	**143**	**57**	**115**	**143**	**139**	**127**
	LSD (Treatment)				NS					LSD (Treatment x Genotype)					NS		
	LSD (Location x Treatment)				0.682**					LSD (Location x Treatment x Genotype)					NS		
	LSD (Genotype)				NS					CV (%)					1.07		
	LSD (Location x Genotype)				2.04**												

Table 6.6.3 Influence of Low-Light Stress on Plant height (cm) flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control						Grand Mean	Treated (Low light)						Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB		IIRR	KJT	MTU	PNR	RPR	TTB	
1	IET 27570	130.8	159.7	233.0	101.3	140.2	134.3	149.9	134.8	168.7	212.5	136.1	121.4	151.7	154.2
2	IET 27571	118.0	128.3	124.0	83.2	144.2	121.3	119.8	126.0	136.3	137.0	99.8	122.5	111.0	122.1
3	IET 27572	141.5	129.7	214.5	82.3	182.3	118.0	144.7	137.0	143.7	220.5	119.3	168.3	128.3	152.8
4	IET 27577	118.8	122.3	154.0	93.1	122.2	124.7	122.5	132.2	135.3	152.0	132.1	124.4	113.7	131.6
5	IET 27581	126.3	142.7	222.5	77.6	131.8	135.7	139.4	108.2	155.0	172.5	102.8	141.5	125.3	134.2
6	IET 27584	96.3	100.7	112.5	77.6	98.1	100.0	97.5	96.8	99.7	127.5	99.8	97.3	111.3	105.4
7	IET 27586	112.7	113.7	157.5	83.8	119.3	107.7	115.8	127.2	111.7	142.0	94.4	127.0	101.0	117.2
8	IET 27588	103.2	108.3	139.5	67.6	107.6	104.3	105.1	102.2	112.7	151.0	94.4	110.0	98.7	111.5
9	IET 26687	96.8	109.0	137.0	80.6	118.6	113.7	109.3	99.8	112.3	133.0	104.3	106.4	97.0	108.8
10	IET 27590	101.8	109.3	143.5	74.0	111.4	108.7	108.1	111.7	141.3	146.0	101.5	112.3	105.3	119.7
11	IET 27592	96.7	106.7	157.5	78.2	111.7	101.7	108.7	106.5	107.3	155.5	95.0	105.7	99.3	111.6
12	IET 27595	113.8	143.7	130.5	77.3	146.7	134.3	124.4	119.0	147.3	137.0	95.1	146.4	135.0	130.0
13	IET 27596	144.8	146.7	148.5	102.9	156.9	128.3	138.0	161.0	167.3	151.5	126.9	157.3	143.3	151.2
14	IET 27597	119.5	137.7	155.0	87.5	124.3	122.3	124.4	124.2	145.0	165.5	108.9	133.7	109.0	131.1
15	IET 27598	125.2	140.7	168.0	90.8	123.3	131.7	129.9	128.8	147.0	178.5	107.4	128.0	124.0	135.6
16	IET 27559	100.3	122.3	163.5	83.6	146.7	108.0	120.7	139.8	127.3	154.0	136.2	123.4	134.3	135.8
17	Swarnaprabha	120.7	118.7	191.0	106.4	138.2	116.0	131.8	139.8	131.3	167.5	132.0	110.2	124.7	134.3
18	IR-8	80.0	88.0	117.0	64.6	99.9	89.7	89.9	82.8	92.3	104.5	81.2	88.2	79.3	88.1
	Mean	**113.7**	**123.8**	**159.4**	**84.0**	**129.1**	**116.7**	**121.1**	**121.0**	**132.3**	**156.0**	**109.3**	**123.6**	**116.2**	**126.4**
	LSD (Treatment)			NS					LSD (Treatment x Genotype)				NS		
	LSD (Location x Treatment)			3.14**					LSD (Location x Treatment x Genotype)				NS		
	LSD (Genotype)			3.85**					CV (%)				5.11		
	LSD (Location x Genotype)			9.44**											

Table 6.6.4 Influence of Low-Light Stress on Leaf weight (g/m2) flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	350	355	0	172	23	84	336	189	272	332	0	236	17	81	266	172
2	IET 27571	251	232	0	204	18	83	289	154	245	229	0	124	8	147	301	151
3	IET 27572	362	281	0	305	18	73	327	195	351	277	0	81	7	80	125	132
4	IET 27577	332	373	0	269	22	56	291	192	341	373	0	133	8	59	277	170
5	IET 27581	270	345	0	288	16	94	256	181	401	396	0	104	9	67	203	169
6	IET 27584	237	344	0	144	6	84	163	140	168	297	0	158	4	62	136	118
7	IET 27586	345	427	0	218	11	68	331	200	336	402	0	138	8	105	242	176
8	IET 27588	235	302	0	140	15	83	242	145	310	280	0	128	5	76	162	137
9	IET 26687	245	173	0	241	15	79	332	155	209	166	0	77	5	128	206	113
10	IET 27590	327	268	0	218	17	84	284	171	370	196	0	55	6	123	246	142
11	IET 27592	272	353	0	221	24	82	278	176	253	366	0	91	8	108	189	145
12	IET 27595	240	865	0	221	17	92	306	249	202	271	0	150	10	128	190	136
13	IET 27596	335	321	0	380	21	143	349	221	392	357	0	149	13	111	378	200
14	IET 27597	240	186	0	289	18	68	252	150	308	187	0	193	5	102	148	135
15	IET 27598	263	223	0	259	18	71	246	154	290	225	0	97	9	97	242	137
16	IET 27559	222	355	0	308	11	65	243	172	295	370	0	143	6	78	209	157
17	Swarnaprabha	219	186	0	187	14	80	146	119	220	174	0	154	4	45	145	106
18	IR-8	160	386	0	189	16	61	120	133	268	343	0	78	5	60	130	126
	Mean	**272**	**332**	**0**	**236**	**17**	**81**	**266**	**172**	**292**	**289**	**0**	**121**	**7**	**93**	**208**	**144**
	LSD (Treatment)				NS					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				14.6**					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				NS					CV (%)					20.2		
	LSD (Location x Genotype)				43.8**												

Table 6.6.5 Influence of Low-Light Stress on Stem weight (g/m2) flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	762	777	0	1976	37	460	1001	716	465	665	0	779	26	491	457	412
2	IET 27571	745	662	0	724	36	477	827	496	477	549	0	364	14	602	709	388
3	IET 27572	926	697	0	763	28	425	679	503	549	692	0	601	10	354	633	406
4	IET 27577	922	838	0	1206	39	524	1032	651	538	860	0	355	13	245	529	363
5	IET 27581	742	1131	0	603	34	549	1018	582	681	1158	0	348	13	292	412	415
6	IET 27584	623	586	0	448	15	405	489	367	435	561	0	526	6	275	227	290
7	IET 27586	813	758	0	1127	21	475	1034	604	503	728	0	725	9	411	489	409
8	IET 27588	803	976	0	514	26	559	546	489	370	949	0	547	8	367	246	355
9	IET 26687	625	244	0	653	18	525	1057	446	283	242	0	290	8	498	290	230
10	IET 27590	883	454	0	721	24	629	621	476	495	475	0	327	8	477	325	301
11	IET 27592	748	560	0	648	36	609	572	453	528	557	0	490	9	414	283	326
12	IET 27595	688	870	0	594	27	563	793	505	333	865	0	341	13	565	315	347
13	IET 27596	909	1129	0	992	46	666	1140	698	688	1128	0	794	23	475	872	569
14	IET 27597	733	363	0	400	29	515	684	389	505	326	0	508	9	420	248	288
15	IET 27598	930	857	0	1914	38	467	617	689	467	886	0	492	14	434	534	404
16	IET 27559	746	978	0	637	14	467	896	534	515	725	0	427	9	456	331	352
17	Swarnaprabha	813	682	0	661	31	475	583	464	423	281	0	410	9	274	254	236
18	IR-8	335	693	0	442	17	416	325	318	351	244	0	467	6	358	227	236
	Mean	**764**	**736**	**0**	**835**	**29**	**512**	**773**	**521**	**478**	**661**	**0**	**488**	**12**	**412**	**410**	**351**
	LSD (Treatment)				11.5*					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				38.5**					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				35.8*					CV (%)					18.9		
	LSD (Location x Genotype)				115.6**												

Table 6.6.6 Influence of Low-light stress on leaf chlorophyll content in different rice genotypes at panicle initiation stage

S.No.	Genotypes	PNR	TTB	NRRI	Grand Mean	PNR	TTB	NRRI	Grand Mean
1	IET 27570	1.52	2.53	1.74	1.95	2.79	2.82	2.85	2.81
2	IET 27571	1.38	2.79	1.35	1.9	2.04	2.49	1.95	2.18
3	IET 27572	1.49	1.61	1.77	1.61	1.77	1.34	1.65	1.58
4	IET 27577	1.99	1.77	1.7	1.83	2.81	0.86	2.78	2.07
5	IET 27581	1.3	2.51	1.98	1.92	2.48	1.53	1.53	1.89
6	IET 27584	1.72	2.39	2.72	2.22	2.98	1.65	2.85	2.45
7	IET 27586	1.83	2.64	2.38	2.27	2.4	2.11	1.79	2.14
8	IET 27588	1.68	1.29	1.92	1.59	3.35	0.97	2.31	2.2
9	IET 26687	1.88	2.08	1.49	1.86	3.89	1.64	1.8	2.53
10	IET 27590	1.34	2.86	1.31	1.9	2.77	2.87	1.63	2.52
11	IET 27592	2.53	2.4	1.52	2.23	2.35	1.79	1.74	1.99
12	IET 27595	1.53	3.52	1.67	2.31	2.02	3.03	1.97	2.38
13	IET 27596	1.58	2.91	1.49	2.06	2.13	3.22	2.23	2.57
14	IET 27597	1.29	1.55	1.27	1.38	2.53	1.9	3.38	2.5
15	IET 27598	1.51	2.63	1.46	1.92	2.04	2.52	2.44	2.32
16	IET 27559	1.21	2.44	1.72	1.8	2.47	2.06	2.1	2.23
17	Swarnaprabha	1.41	1.65	2.27	1.71	1.85	1.59	2.26	1.85
18	IR-8	2.73	2.49	2.49	2.58	2.01	2.19	2.07	2.09
	Mean	**1.66**	**2.34**	**1.79**	**1.95**	**2.48**	**2.82**	**2.18**	**2.81**
	LSD (Treatment)				0.12*				
	LSD (Treatment x Location)				Ns				
	LSD (Genotype)				NS				
	LSD (Location x Treatment)				NS				
	LSD (Treatment x Genotype)				0.332**				
	CV (%)				15.63				

Table 6.6.7 Influence of Low-light stress on leaf chlorophyll content in different rice genotypes at flowering stage

S.No.	Genotypes	PNR	TTB	NRRI	Grand Mean	PNR	TTB	NRRI	Grand Mean
1	IET 27570	1.7	4.08	1.73	2.6	3.7	3.98	2.72	3.56
2	IET 27571	1.62	4.37	2.1	2.77	3.18	3.24	1.69	2.83
3	IET 27572	1.6	3.01	1.76	2.17	3.13	1.62	1.92	2.26
4	IET 27577	2.5	3.18	2.44	2.74	2.87	1.27	1.73	1.99
5	IET 27581	1.46	3.87	2.21	2.55	2.78	2.33	1.94	2.4
6	IET 27584	2.05	3.54	2.12	2.63	3.51	2.32	2.01	2.69
7	IET 27586	2.24	4.19	1.69	2.84	3.18	3.21	2.35	2.98
8	IET 27588	2.12	2.43	1.68	2.13	4.05	1.75	1.91	2.65
9	IET 26687	2.19	2.85	2.08	2.41	4.42	2.13	2.38	3.05
10	IET 27590	1.43	5.01	1.91	2.89	2.71	3.81	2.98	3.19
11	IET 27592	2.82	3.72	2.37	3.05	3.32	2.83	2.63	2.96
12	IET 27595	1.77	5.4	1.95	3.17	3.18	4.86	2.42	3.62
13	IET 27596	1.72	4.95	2	3	3.17	4.49	1.85	3.34
14	IET 27597	1.57	1.99	2.64	2	3.77	2.32	2.38	2.88
15	IET 27598	1.74	3.37	2.32	2.5	3.22	2.93	1.89	2.78
16	IET 27559	1.7	3.75	1.82	2.5	3.24	2.88	2.17	2.84
17	Swarnaprabha	1.71	2.63	2.07	2.14	2.84	2.3	2.77	2.62
18	IR-8	2.97	3.48	2.45	3.03	3.35	3.28	2.77	3.18
	Mean	**1.94**	**3.66**	**2.07**	**2.62**	**3.31**	**2.86**	**2.25**	**2.88**
	LSD (Treatment)				0.105*				
	LSD (Treatment x Location)				NS				
	LSD (Genotype)				0.43*				
	LSD (Location x Treatment)				NS				
	LSD (Treatment x Genotype)				0.44**				
	CV (%)				13.4				

Table 6.6.8 Influence of Low-Light Stress on Panicle weight (g/m2) flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	213	363	0	107	6.9	156	189	173	76	377	0	70	4.97	121	92	123
2	IET 27571	192	327	0	309	19.9	151	194	199	82	222	0	137	3.33	118	62	104
3	IET 27572	210	373	0	295	12.5	154	311	226	105	286	0	174	5.29	105	191	144
4	IET 27577	167	428	0	348	7.8	153	215	220	80	486	0	192	4.13	88	153	167
5	IET 27581	203	350	0	348	9.3	170	251	222	135	387	0	84	3.05	100	118	138
6	IET 27584	133	347	0	174	5.9	132	147	156	99	397	0	93	1.67	107	163	144
7	IET 27586	222	570	0	271	8.0	183	153	234	84	582	0	73	2.20	106	81	155
8	IET 27588	137	192	0	175	9.4	202	142	143	89	192	0	72	2.52	193	65	102
9	IET 26687	138	218	0	321	6.0	210	169	177	57	212	0	62	2.38	123	76	89
10	IET 27590	175	282	0	253	15.3	148	133	168	119	229	0	43	4.37	117	75	98
11	IET 27592	172	285	0	316	11.5	155	215	193	71	294	0	129	3.50	128	54	113
12	IET 27595	208	285	0	156	7.9	132	182	162	76	284	0	119	3.66	189	63	122
13	IET 27596	235	374	0	356	10.7	153	239	228	131	367	0	84	6.33	201	157	158
14	IET 27597	146	246	0	276	9.9	208	176	177	143	271	0	186	2.10	115	42	126
15	IET 27598	138	238	0	184	13.3	118	169	143	69	312	0	84	2.40	111	173	125
16	IET 27559	130	282	0	301	8.9	160	320	200	133	370	0	131	5.19	132	89	143
17	Swarnaprabha	159	191	0	308	10.7	156	354	197	132	176	0	235	4.86	113	104	127
18	IR-8	153	391	0	143	8.2	111	126	155	281	219	0	58	2.67	135	108	134
	Mean	**174**	**319**	**0**	**258**	**10.1**	**158**	**205**	**187**	**109**	**315**	**0**	**113**	**3.59**	**128**	**104**	**129**
	LSD (Treatment)				NS					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				11.03**					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				ns					CV (%)					16.74		
	LSD (Location x Genotype)				33.06**												

Table 6.6.9 Influence of Low-Light Stress on Total dry matter (g/m2) flowering in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	1325	1495	396	2255	66.5	701	1526	1109	808	1397	352	1019	46.0	726	776	732
2	IET 27571	1188	1221	340	1237	73.1	710	1310	868	803	1033	320	625	25.4	866	1073	678
3	IET 27572	1497	1351	389	1363	59.4	652	1317	947	1005	1256	340	856	22.3	539	949	709
4	IET 27577	1420	1639	375	1823	68.2	732	1538	1085	959	1719	364	680	24.9	392	960	728
5	IET 27581	1215	1826	376	1238	59.9	813	1524	1007	1217	1942	376	536	25.6	459	734	756
6	IET 27584	992	1277	428	767	26.9	621	799	701	702	1255	403	778	11.7	444	527	588
7	IET 27586	1379	1755	307	1617	40.0	726	1519	1049	923	1712	247	936	19.4	621	812	753
8	IET 27588	1175	1471	332	829	50.3	844	931	805	769	1421	313	746	16.3	636	473	625
9	IET 26687	1007	1636	293	1214	38.3	815	1558	937	549	1620	294	429	15.5	750	571	604
10	IET 27590	1385	1670	379	1192	56.4	860	1039	940	984	1900	374	424	17.8	716	646	723
11	IET 27592	1192	1199	351	1184	71.6	847	1065	844	851	1217	347	710	20.5	650	527	617
12	IET 27595	1135	2020	361	971	51.8	787	1281	944	611	1419	307	609	26.8	881	568	632
13	IET 27596	1479	1825	363	1729	77.4	961	1729	1166	1210	1852	354	1027	43.0	788	1407	954
14	IET 27597	1119	1795	385	965	57.0	790	1112	889	955	1783	384	887	15.6	637	437	728
15	IET 27598	1330	1317	314	2357	70.0	657	1032	1011	825	1423	302	673	25.7	642	950	692
16	IET 27559	1098	1614	387	1246	30.3	692	1460	932	942	1465	384	701	20.1	666	629	687
17	Swarnaprabha	1191	1059	323	1156	55.8	712	1084	797	774	1031	323	799	17.5	432	503	554
18	IR-8	648	1471	375	773	42.1	588	571	638	899	1373	355	603	14.0	553	466	609
	Mean	**1210**	**1536**	**360**	**1329**	**55.3**	**750**	**1244**	**926**	**877**	**1490**	**341**	**724**	**22.7**	**633**	**723**	**687**
	LSD (Treatment)				NS					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				52.4**					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				48.78*					CV (%)					13.5		
	LSD (Location x Genotype)				157.3**												

Table 6.6.10 Influence of Low-Light Stress on Shoot weight (g/m2) maturity in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	1565	1740	497	2905	474	952	1411	1363	818	1570	489	1491	400	536	684	856
2	IET 27571	953	1645	441	1547	574	842	1286	1041	594	1640	434	679	304	562	910	732
3	IET 27572	808	1551	514	1725	474	771	1094	991	787	1956	470	957	217	480	917	826
4	IET 27577	1038	1801	482	2128	451	814	1234	1135	1005	1879	478	781	384	455	763	821
5	IET 27581	865	1699	516	1516	497	834	1323	1036	803	1673	511	638	433	552	638	750
6	IET 27584	688	1200	590	891	265	626	643	700	540	1831	543	888	467	462	298	718
7	IET 27586	835	1653	382	1909	487	729	1025	1003	676	2019	319	1108	402	556	611	813
8	IET 27588	886	1834	430	976	370	907	957	909	716	2147	426	702	440	611	329	767
9	IET 26687	776	1333	394	1384	307	969	1231	913	585	1509	370	425	570	516	483	637
10	IET 27590	793	1210	519	1327	574	822	810	865	601	1452	470	497	446	594	436	642
11	IET 27592	679	1448	445	1444	514	771	884	884	657	1641	418	809	527	508	458	717
12	IET 27595	820	1739	448	1128	481	871	1065	936	974	1667	381	694	588	628	553	784
13	IET 27596	1026	2180	452	2035	524	949	1320	1212	1226	2278	437	1273	403	698	977	1042
14	IET 27597	843	2083	486	1150	527	924	709	960	637	1755	482	1026	464	568	321	750
15	IET 27598	1108	2462	384	2743	569	763	1203	1319	1038	2388	375	791	200	545	808	878
16	IET 27559	749	1699	486	1455	419	761	1068	948	461	1609	482	850	210	580	387	654
17	Swarnaprabha	876	1628	395	1320	361	699	684	852	535	1604	393	970	271	449	483	672
18	IR-8	556	1448	468	916	641	647	405	726	651	1428	440	689	250	409	531	628
	Mean	**881**	**1686**	**463**	**1583**	**473**	**814**	**1020**	**989**	**739**	**1780**	**440**	**848**	**388**	**539**	**588**	**760**
	LSD (Treatment)			ns						LSD (Treatment x Genotype)				70.13*			
	LSD (Location x Treatment)			53.3**						LSD (Location x Treatment x Genotype)				ns			
	LSD (Genotype)			65.3**						CV (%)				12			
	LSD (Location x Genotype)			159.1**													

Table 6.6.11 Influence of Low-Light Stress on Panicle weight (g/m2) maturity in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	867	743	858	204	548	667	734	660	485	623	509	154	305	375	229	383
2	IET 27571	666	383	726	588	507	591	656	588	511	353	617	338	317	393	235	395
3	IET 27572	896	527	771	794	508	539	710	678	467	430	556	400	187	336	244	374
4	IET 27577	1003	878	600	927	437	571	588	715	455	738	444	426	305	319	206	413
5	IET 27581	652	460	597	696	488	585	782	609	448	519	426	203	402	388	256	377
6	IET 27584	989	452	816	653	463	439	454	609	672	405	520	226	439	323	179	395
7	IET 27586	917	972	485	560	460	510	725	661	478	844	348	187	410	389	497	451
8	IET 27588	654	294	597	591	488	640	307	510	374	264	567	211	471	428	151	352
9	IET 26687	551	330	494	878	385	736	452	546	347	290	363	131	388	362	258	305
10	IET 27590	785	258	461	765	472	571	738	578	253	162	367	163	285	416	235	269
11	IET 27592	529	379	823	826	428	541	768	613	365	362	674	293	318	355	184	364
12	IET 27595	722	352	597	317	337	610	546	497	471	323	523	275	426	438	271	389
13	IET 27596	942	764	728	616	447	664	524	669	552	654	531	157	347	488	370	443
14	IET 27597	733	370	645	793	360	646	571	588	284	296	580	422	374	398	171	361
15	IET 27598	713	473	697	354	507	535	654	562	479	425	615	195	433	381	272	400
16	IET 27559	663	674	702	960	349	533	777	665	333	624	582	341	341	406	245	410
17	Swarnaprabha	1053	247	600	888	402	490	483	595	250	167	462	480	206	314	311	313
18	IR-8	908	263	584	607	322	453	821	565	237	263	485	127	220	286	258	268
	Mean	**791**	**490**	**655**	**667**	**439**	**573**	**627**	**606**	**414**	**430**	**509**	**263**	**343**	**378**	**254**	**370**
	LSD (Treatment)				12.7*					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				41.17**					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				ns					CV (%)					17		
	LSD (Location x Genotype)				123.5**												

Table 6.6.12 Influence of Low-Light Stress on Grain number/panicle in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	113	0	156	0	185	127	208	158	75	0	123	0	188	135	147	133
2	IET 27571	68	0	143	0	183	189	230	163	55	0	129	0	225	138	120	133
3	IET 27572	88	0	143	56	166	173	290	143	60	0	128	80	161	123	158	119
4	IET 27577	98	0	132	117	153	158	263	134	53	0	117	0	146	103	137	111
5	IET 27581	91	0	169	0	139	163	238	160	60	0	134	0	187	118	155	131
6	IET 27584	94	0	104	117	159	152	250	152	73	0	81	39	197	125	138	123
7	IET 27586	78	0	143	0	166	189	290	173	49	0	113	0	124	124	196	121
8	IET 27588	70	0	130	98	183	193	155	138	54	0	116	41	135	187	117	122
9	IET 26687	66	0	134	130	125	147	165	128	57	0	121	0	150	145	135	121
10	IET 27590	87	0	144	141	140	132	308	159	40	0	121	48	116	137	157	114
11	IET 27592	71	0	171	106	156	139	290	155	39	0	152	71	87	151	178	121
12	IET 27595	113	0	146	0	200	191	193	169	60	0	126	0	169	196	165	143
13	IET 27596	130	0	179	0	215	220	233	196	77	0	140	0	153	206	157	147
14	IET 27597	79	0	133	119	167	164	285	158	32	0	121	0	148	135	138	115
15	IET 27598	73	0	173	0	157	118	281	161	49	0	151	0	157	131	163	130
16	IET 27559	82	0	143	140	177	158	240	160	76	0	127	69	163	155	178	128
17	Swarnaprabha	73	0	71	140	163	155	280	149	35	0	56	98	147	132	238	118
18	IR-8	96	0	188	126	200	164	385	206	31	0	167	0	146	159	225	121
	Mean	**87**	**0**	**145**	**72**	**169**	**163**	**255**	**164**	**54**	**0**	**123**	**25**	**155**	**144**	**161**	**111**
	LSD (Treatment)					5.01**				LSD (Treatment x Genotype)						ns	
	LSD (Location x Treatment)					12.26**				LSD (Location x Treatment x Genotype)						ns	
	LSD (Genotype)					ns				CV (%)						25	
	LSD (Location x Genotype)					36.8**											

Table 6.6.13 Influence of Low-Light Stress on Spikelet number/panicle in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	NRRI	TTB		IIRR	KJT	MTU	PNR	RPR	NRRI	TTB	
1	IET 27570	190	0	173	255	138	240	149	191	147	0	153	235	162	157	167	170
2	IET 27571	111	0	154	133	195	127	206	154	83	0	152	177	161	96	171	140
3	IET 27572	132	0	156	181	190	132	194	164	92	0	148	174	126	118	153	135
4	IET 27577	136	0	145	161	166	139	170	153	79	0	143	107	208	86	128	125
5	IET 27581	121	0	191	135	140	193	201	164	76	0	166	190	175	127	147	147
6	IET 27584	109	0	115	157	142	93	171	131	94	0	102	85	183	76	156	116
7	IET 27586	107	0	156	114	209	157	209	159	75	0	134	272	142	170	153	158
8	IET 27588	119	0	141	134	196	169	207	161	92	0	138	183	140	128	222	151
9	IET 26687	92	0	147	223	152	156	160	155	71	0	138	210	163	174	178	156
10	IET 27590	108	0	155	216	120	122	145	144	74	0	142	149	194	141	169	145
11	IET 27592	162	0	182	183	142	226	158	176	95	0	177	359	165	175	187	193
12	IET 27595	140	0	159	179	230	171	208	181	79	0	145	159	188	79	237	148
13	IET 27596	179	0	194	159	170	103	253	176	113	0	165	347	187	128	251	198
14	IET 27597	115	0	146	173	176	154	179	157	71	0	142	176	149	153	169	143
15	IET 27598	91	0	188	52	166	104	132	122	57	0	175	118	140	111	161	127
16	IET 27559	125	0	159	200	192	123	172	162	108	0	151	156	178	97	193	147
17	Swarnaprabha	121	0	79	226	190	63	171	142	83	0	70	417	142	105	164	164
18	IR-8	123	0	200	163	155	77	180	150	67	0	187	132	110	86	195	130
	Mean	**127**	**0**	**158**	**169**	**170**	**142**	**181**	**158**	**86**	**0**	**146**	**203**	**162**	**123**	**178**	**150**
	LSD (Treatment)				NS					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				20.7**					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				ns					CV (%)					31.6		
	LSD (Location x Genotype)				62.1**												

Table 6.6.14 Influence of Low-Light Stress on Grain number/m2 in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	35933	0	65439	0	4625	19651	40376	40350	20072	0	41690	0	4708	18041	14619	22157
2	IET 27571	19752	0	63085	0	4575	41183	26975	37749	18104	0	42504	0	5625	36113	8433	22078
3	IET 27572	33233	0	62766	25950	4158	27753	31305	26452	19303	0	46343	16000	4033	21829	11445	19826
4	IET 27577	39194	0	60654	37083	3833	35374	28933	29296	17415	0	42614	0	3658	24796	8537	19404
5	IET 27581	24855	0	64922	0	3483	30287	42006	32414	19179	0	44374	0	4575	20064	16195	20877
6	IET 27584	33592	0	46123	23400	3967	35953	21830	23577	25142	0	26763	7183	4917	22083	9393	14348
7	IET 27586	32480	0	50226	0	4158	40191	41056	21176	18054	0	33198	0	3092	30846	26367	22311
8	IET 27588	26355	0	47344	27867	4575	39717	23000	36850	17703	0	39633	7400	3375	41748	12332	22958
9	IET 26687	22041	0	37400	32267	3117	36986	22751	29721	16432	0	27896	0	3742	31192	20790	13210
10	IET 27590	36007	0	57046	25517	3492	27731	33315	46526	12441	0	39864	4800	2900	28339	17935	17713
11	IET 27592	21106	0	79013	44133	3908	40915	47285	50059	14782	0	59851	10700	2167	34103	20557	23693
12	IET 27595	28983	0	60929	0	5000	43256	30054	33644	19593	0	47124	0	4217	52522	9687	26628
13	IET 27596	33910	0	73106	0	5375	55364	22242	37999	21600	0	50930	0	3833	36406	15823	25718
14	IET 27597	27888	0	54010	25617	4175	45014	40821	26117	12407	0	41195	0	3700	25564	18374	20248
15	IET 27598	26684	0	74437	0	3925	28188	25853	31817	18876	0	59697	0	3917	30860	16038	25878
16	IET 27559	29119	0	61347	30033	4425	34449	26823	31033	16678	0	44539	11283	4083	37778	14301	21444
17	Swarnaprabha	32405	0	29139	27933	4083	38220	14619	21963	11197	0	19855	14700	3667	30057	21179	16776
18	IR-8	29803	0	73986	22967	5000	31988	22916	27291	7994	0	55088	0	3642	39134	17413	20545
	Mean	**29630**	**0**	**58943**	**17931**	**4215**	**36234**	**30120**	**24492**	**17054**	**0**	**42398**	**10295**	**3881**	**31193**	**15523**	**20878**
	LSD (Treatment)					768*				LSD (Treatment x Genotype)						NS	
	LSD (Location x Treatment)					2476**				LSD (Location x Treatment x Genotype)						NS	
	LSD (Genotype)					NS				CV (%)						24.31	
	LSD (Location x Genotype)					7429**											

Table 6.6.15 Influence of Low-Light Stress on Spikelet number/m2 in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	60647	0	72556	51067	3458	23041	50191	43493	39505	0	52151	41700	4042	22303	22949	30442
2	IET 27571	32304	0	68024	30367	4875	44826	29158	34926	27587	0	50116	41167	4033	44743	11463	29851
3	IET 27572	49579	0	68354	84267	4750	31108	38198	46043	29055	0	53845	34800	3142	26992	18583	27736
4	IET 27577	54115	0	66792	50917	4158	38084	37139	41868	26414	0	51953	18967	5208	30931	11646	24187
5	IET 27581	32987	0	73260	55517	3508	37479	45968	41453	24182	0	54901	33200	4375	25025	19576	26877
6	IET 27584	39130	0	51106	31467	3542	40582	23163	31498	32185	0	33583	15283	4583	27522	10418	20596
7	IET 27586	44390	0	55088	43200	5217	44262	45465	39604	27224	0	39556	75833	3550	38083	33497	36291
8	IET 27588	45029	0	51469	37950	4892	42685	25970	34666	30185	0	47036	35200	3500	49089	14866	29979
9	IET 26687	30513	0	40777	54733	3800	40438	25749	32668	20533	0	31801	59333	4075	38408	23303	29576
10	IET 27590	44458	0	61655	39100	3000	30553	37606	36062	23327	0	47003	14867	4858	35062	22064	24530
11	IET 27592	48711	0	84403	76050	3542	46398	65737	54140	35688	0	69443	53850	4117	42260	31194	39425
12	IET 27595	36094	0	66209	68600	5742	47242	33380	42878	25895	0	54098	31800	4708	63541	12985	32171
13	IET 27596	46465	0	79035	50033	4258	63472	23986	44542	31993	0	60082	34733	4667	44232	19971	32613
14	IET 27597	40518	0	59444	37433	4392	49076	45474	39389	27720	0	48587	38667	3717	31911	21063	28611
15	IET 27598	33184	0	80553	12650	4150	31248	29049	31806	21778	0	69421	21767	3508	38130	18143	28791
16	IET 27559	44623	0	68409	44083	4800	37465	29465	38141	23794	0	53130	26333	4458	47004	17335	28676
17	Swarnaprabha	53469	0	32285	45267	4750	42171	17716	32610	26355	0	24530	62600	3550	37223	26487	30124
18	IR-8	38664	0	78705	29117	3867	35040	29854	35874	17909	0	61941	26750	2742	48082	21334	29793
	Mean	**43049**	**0**	**64340**	**46768**	**4261**	**40287**	**35182**	**38981**	**27296**	**0**	**50177**	**37047**	**4046**	**38363**	**19826**	**29459**
	LSD (Treatment)				NS					LSD (Treatment x Genotype)					NS		
	LSD (Location x Treatment)				4533**					LSD (Location x Treatment x Genotype)					NS		
	LSD (Genotype)				NS					CV (%)					20.72		
	LSD (Location x Genotype)				13601**												

Table 6.6.16 Influence of Low-Light Stress on Grain yield (g/m2) in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	665	391	515	0	399	469	551	498	374	274	470	0	256	202	129	284
2	IET 27571	508	321	463	0	401	453	537	447	425	225	412	0	212	196	138	268
3	IET 27572	728	348	501	494	382	462	544	494	392	244	421	229	205	175	185	265
4	IET 27577	853	554	477	704	329	458	499	554	373	388	426	0	226	146	151	285
5	IET 27581	541	637	543	0	445	509	658	555	388	446	495	0	190	167	198	314
6	IET 27584	898	406	639	556	474	397	390	537	597	284	530	160	206	178	118	296
7	IET 27586	798	680	398	0	473	548	591	581	398	476	326	0	255	176	403	339
8	IET 27588	506	442	440	442	376	606	270	440	295	310	415	176	177	322	114	259
9	IET 26687	459	194	408	503	338	631	366	414	304	136	373	0	162	205	103	214
10	IET 27590	685	294	530	514	367	443	620	493	203	206	445	83	179	194	174	212
11	IET 27592	362	385	459	583	437	465	610	472	254	270	408	186	184	214	132	235
12	IET 27595	621	529	466	0	377	396	458	475	399	370	357	0	223	315	176	307
13	IET 27596	788	780	484	0	497	458	425	572	461	546	434	0	194	336	214	364
14	IET 27597	609	236	512	514	458	623	496	493	218	165	475	0	241	192	111	234
15	IET 27598	607	482	383	0	374	354	553	459	424	338	359	0	201	185	208	286
16	IET 27559	555	529	515	749	383	481	608	546	270	370	482	260	194	221	181	283
17	Swarnaprabha	856	167	415	728	397	468	352	483	218	150	380	350	207	188	202	242
18	IR-8	794	193	474	458	406	333	660	474	169	139	436	0	211	226	179	227
	Mean	**657**	**421**	**479**	**347**	**406**	**475**	**510**	**471**	**342**	**296**	**425**	**80**	**207**	**213**	**173**	**248**
	LSD (Treatment)				9.5**					LSD (Treatment x Genotype)					NS		
	LSD (Location x Treatment)				23.5**					LSD (Location x Treatment x Genotype)					NS		
	LSD (Genotype)				NS					CV (%)					13.01		
	LSD (Location x Genotype)				70.3**												

Table 6.6.17 Influence of Low-Light Stress on Total dry matter (g/m2) maturity in different rice varieties during Kharif 2019 at different centres

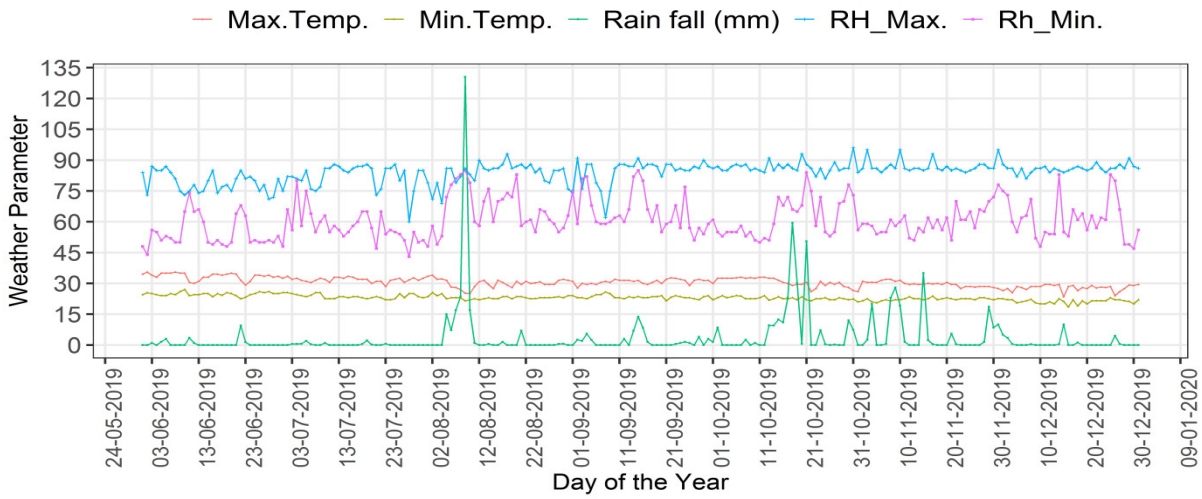
S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI		IIRR	KJT	MTU	PNR	RPR	TTB	NRRI	
1	IET 27570	2432	1253	1011	3109	1022	1619	2145	1799	1303	1200	959	1645	704	912	913	1091
2	IET 27571	1619	1142	904	2134	1081	1434	1942	1465	1104	993	846	1018	620	955	1145	955
3	IET 27572	1704	1130	1015	2519	982	1310	1804	1495	1254	1101	891	1357	404	816	1061	984
4	IET 27577	2041	1683	959	3055	887	1385	1822	1690	1460	1659	904	1207	689	774	919	1087
5	IET 27581	1517	1942	1059	2212	986	1419	2106	1606	1251	1935	1005	841	835	940	894	1100
6	IET 27584	1677	1226	1229	1544	728	1065	1096	1224	1212	1175	1073	1114	906	784	727	999
7	IET 27586	1752	1632	780	2469	947	1239	1749	1510	1154	1663	645	1295	813	945	1008	1075
8	IET 27588	1540	1273	870	1567	859	1547	1265	1274	1090	1221	842	913	911	1039	630	949
9	IET 26687	1327	946	802	2261	692	1705	1682	1345	932	952	742	556	958	878	741	823
10	IET 27590	1578	972	1049	2092	1046	1393	1548	1382	854	999	915	660	731	1009	771	848
11	IET 27592	1208	1114	904	2269	942	1313	1652	1343	1022	1110	826	1102	846	863	642	916
12	IET 27595	1542	1172	914	1445	818	1481	1611	1283	1445	1306	738	969	1014	1066	824	1052
13	IET 27596	1968	1465	936	2652	970	1613	1445	1578	1778	1739	871	1430	749	1186	1547	1329
14	IET 27597	1576	998	998	1943	887	1570	1280	1322	921	993	957	1448	838	966	491	945
15	IET 27598	1821	1408	768	3096	1076	1298	1857	1618	1517	1397	734	986	633	926	1080	1039
16	IET 27559	1412	1146	1001	2415	768	1294	1644	1383	793	1442	964	1191	552	986	782	958
17	Swarnaprabha	1929	1026	810	2208	763	1189	1217	1306	786	986	774	1451	476	764	794	861
18	IR-8	1464	1059	943	1523	962	1100	1226	1182	888	958	876	816	470	695	789	785
	Mean	**1673**	**1255**	**942**	**2251**	**912**	**1387**	**1616**	**1434**	**1154**	**1268**	**865**	**1111**	**731**	**917**	**875**	**989**
	LSD (Treatment)				NS					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				70**					LSD (Location x Treatment x Genotype)					ns		
	LSD (Genotype)				85**					CV (%)					11.7		
	LSD (Location x Genotype)				210**												

Table 6.6.18 Influence of Low-Light Stress on 1000 grain weight (g) in different rice varieties during Kharif 2019 at different centres

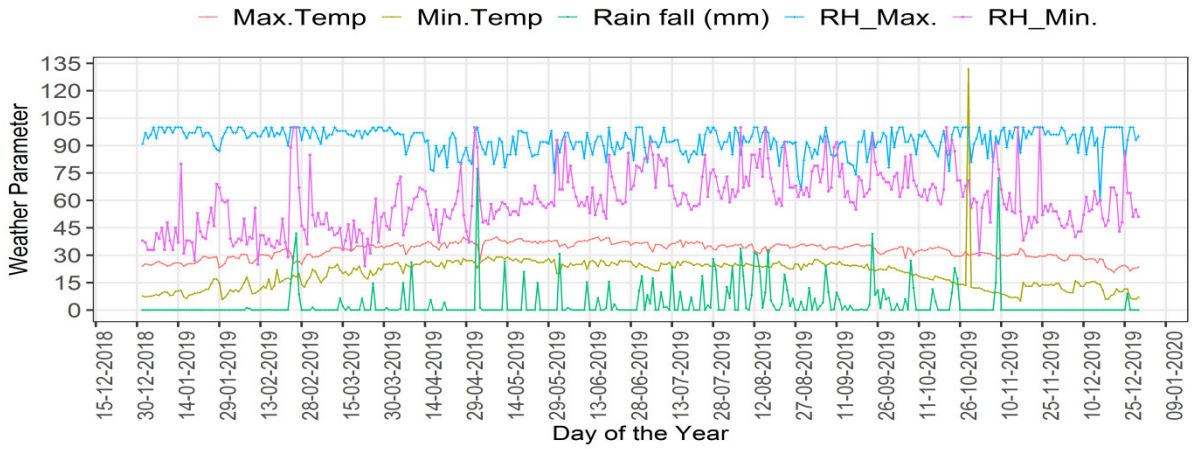
S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR	NRRI	TTB		IIRR	KJT	MTU	PNR	RPR	NRRI	TTB	
1	IET 27570	18.5	0.0	22.9	0.0	30.5	22.9	19.3	22.8	18.6	0.0	18.7	0.0	15.6	22.2	18.3	18.7
2	IET 27571	25.8	0.0	20.5	0.0	30.0	28.4	25.3	26.0	23.5	0.0	18.8	0.0	14.9	24.8	18.7	20.1
3	IET 27572	22.0	0.0	22.1	27.0	31.2	21.9	22.7	24.5	20.3	0.0	16.9	19.4	17.9	22.0	21.7	19.7
4	IET 27577	21.8	0.0	22.1	23.2	29.3	22.9	21.0	23.4	21.4	0.0	17.3	0.0	15.8	23.2	18.7	16.1
5	IET 27581	21.8	0.0	22.0	0.0	30.1	22.7	23.3	20.0	20.3	0.0	19.9	0.0	15.9	20.8	20.7	16.2
6	IET 27584	26.7	0.0	22.0	26.6	28.7	26.7	24.3	25.8	23.8	0.0	16.3	22.8	16.2	25.1	19.0	20.5
7	IET 27586	24.6	0.0	21.4	0.0	29.1	25.2	29.0	21.5	22.1	0.0	17.4	0.0	18.3	24.1	24.3	17.7
8	IET 27588	19.2	0.0	21.9	18.7	30.1	21.8	19.7	21.9	16.7	0.0	19.4	15.3	15.3	21.1	18.7	17.7
9	IET 26687	20.8	0.0	22.9	24.0	31.4	21.6	23.7	24.1	18.4	0.0	19.8	0.0	68.1	20.7	19.0	24.3
10	IET 27590	19.0	0.0	22.5	25.1	27.1	21.5	22.0	22.9	16.3	0.0	20.5	17.8	15.7	19.4	20.0	18.3
11	IET 27592	17.2	0.0	21.4	16.6	30.5	19.2	20.0	20.8	17.2	0.0	18.4	20.1	18.0	20.4	17.0	18.5
12	IET 27595	21.4	0.0	20.8	0.0	31.3	22.4	25.7	24.3	20.3	0.0	18.8	0.0	18.3	23.3	20.7	20.3
13	IET 27596	23.3	0.0	21.1	0.0	30.3	27.1	27.3	25.8	21.2	0.0	17.7	0.0	19.2	24.7	23.7	21.3
14	IET 27597	21.8	0.0	19.9	26.7	30.8	22.3	23.7	24.2	17.6	0.0	18.5	0.0	19.3	20.6	18.0	18.8
15	IET 27598	22.7	0.0	20.7	0.0	30.8	25.2	25.3	25.0	22.5	0.0	18.9	0.0	19.0	23.4	21.7	21.1
16	IET 27559	19.1	0.0	20.5	28.5	29.4	22.4	30.7	25.1	16.2	0.0	17.1	23.3	18.9	21.3	20.7	19.6
17	Swarnaprabha	26.4	0.0	21.1	28.8	29.5	27.6	27.7	26.8	19.5	0.0	16.8	25.7	16.8	22.9	22.7	20.7
18	IR-8	26.7	0.0	21.0	24.4	28.9	26.4	30.0	26.2	21.1	0.0	18.6	0.0	16.0	22.8	20.0	19.7
	Mean	**22.1**	**0.0**	**21.5**	**15.0**	**29.9**	**23.8**	**24.5**	**22.8**	**19.8**	**0.0**	**18.3**	**8.0**	**20.0**	**22.4**	**20.2**	**18.1**
	LSD (Treatment)				0.96*					LSD (Treatment x Genotype)					ns		
	LSD (Location x Treatment)				3.113**					LSD(Location x Treatment x Genotype)					ns		
	LSD (Genotype)				ns					CV(%)					28		
	LSD (Location x Genotype)				9.33**												

Table 6.6.19 Influence of Low-Light Stress on Harvest Index (%) in different rice varieties during Kharif 2019 at different centres

S.No.	Genotypes	Control							Grand Mean	Treated (Low light)							Grand Mean
		IIRR	KJT	MTU	PNR	RPR		TTB		IIRR	KJT	MTU	PNR	RPR		TTB	
1	IET 27570	27.3	45.4	50.9	0.0	42.2	25.7	29.0	36.7	28.4	44.4	49.0	0.0	44.3	14.3	22.3	33.8
2	IET 27571	31.2	44.4	51.2	0.0	37.1	27.7	31.6	37.2	38.4	45.4	48.7	0.0	35.4	18.5	20.5	34.5
3	IET 27572	42.5	45.5	49.3	19.6	40.5	30.2	35.3	37.5	31.4	45.5	47.3	16.9	51.0	22.8	21.5	33.8
4	IET 27577	41.8	44.4	49.9	23.0	38.9	27.4	33.1	36.9	25.7	44.4	47.1	0.0	32.9	22.6	18.8	31.9
5	IET 27581	35.6	45.5	51.3	0.0	46.2	31.2	35.9	40.9	31.2	45.5	49.2	0.0	31.8	22.3	17.8	33.0
6	IET 27584	53.5	44.4	52.0	36.0	65.7	35.4	37.3	46.3	49.1	50.0	49.4	14.4	27.1	24.9	22.7	33.9
7	IET 27586	45.7	44.4	51.0	0.0	51.3	33.6	44.4	45.1	34.4	44.4	50.6	0.0	36.8	40.0	18.6	37.5
8	IET 27588	32.8	45.5	50.6	28.2	48.8	21.3	39.2	38.1	27.9	45.5	49.3	19.8	21.5	24.0	30.9	31.3
9	IET 26687	34.5	46.5	50.9	22.2	52.7	21.7	37.0	37.9	32.2	45.5	50.3	0.0	17.3	14.0	23.4	30.4
10	IET 27590	43.4	47.6	50.5	24.5	37.1	40.1	31.8	39.3	23.6	44.5	48.7	12.9	28.9	25.9	19.3	29.1
11	IET 27592	29.9	45.4	50.8	25.6	46.2	37.0	35.4	38.6	24.6	45.4	49.4	16.8	22.4	20.6	24.8	29.1
12	IET 27595	40.1	46.5	51.0	0.0	53.9	28.4	26.7	41.1	27.8	43.5	48.3	0.0	24.8	21.3	29.6	32.5
13	IET 27596	40.2	46.7	51.7	0.0	54.9	31.6	28.4	42.3	25.6	45.5	49.8	0.0	29.4	15.9	28.3	32.4
14	IET 27597	38.5	45.4	51.3	26.6	63.3	38.8	39.7	43.4	23.6	44.4	49.7	0.0	40.4	22.4	19.9	33.4
15	IET 27598	33.5	44.4	50.0	0.0	36.1	29.9	27.3	36.9	28.0	50.0	49.0	0.0	34.1	19.3	20.1	33.4
16	IET 27559	39.4	45.5	51.4	31.0	50.2	40.8	37.2	42.2	34.0	45.5	50.0	21.8	39.5	28.6	22.4	34.5
17	Swarnaprabha	44.5	46.5	51.3	33.0	55.3	33.0	39.4	43.3	27.8	44.5	49.2	24.1	45.6	25.2	24.6	34.4
18	IR-8	54.3	45.5	50.3	30.1	45.5	53.9	30.3	44.3	19.2	46.1	49.7	0.0	48.3	22.8	32.5	36.4
	Mean	**39.4**	**45.5**	**50.9**	**16.7**	**48.1**	**32.6**	**34.4**	**38.2**	**29.6**	**45.5**	**49.1**	**7.0**	**34.0**	**22.5**	**23.2**	**30.1**
	LSD (Treatment)					ns				LSD (Treatment x Genotype)						ns	
	LSD (Location x Treatment)					3.92**				LSD (Location x Treatment x Genotype)						ns	
	LSD (Genotype)					ns				CV (%)						21.90	
	LSD (Location x Genotype)					9.9**											



Important weather parameters recorded at CBT centre during the crop growth period in Kharif-2019 season



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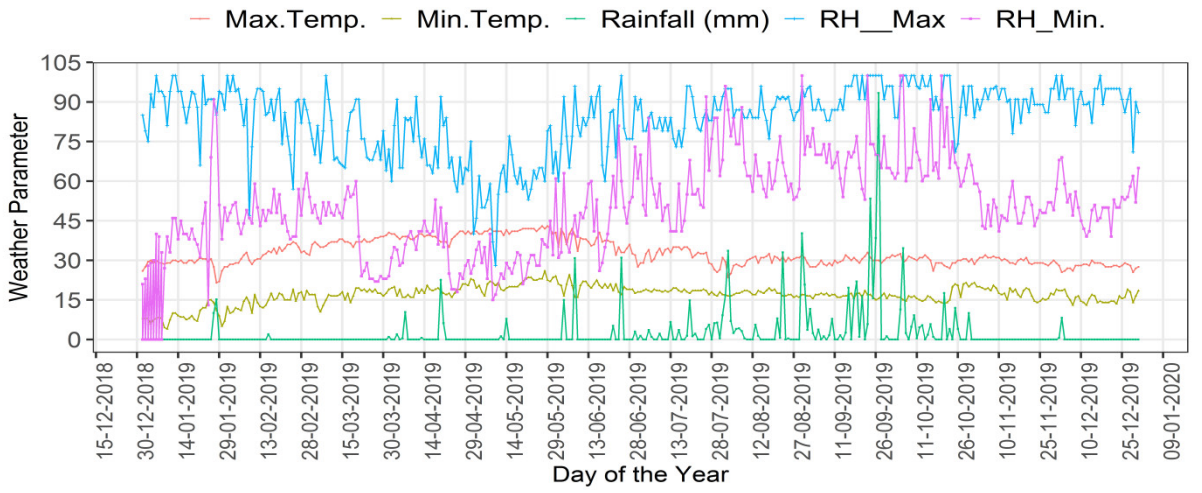
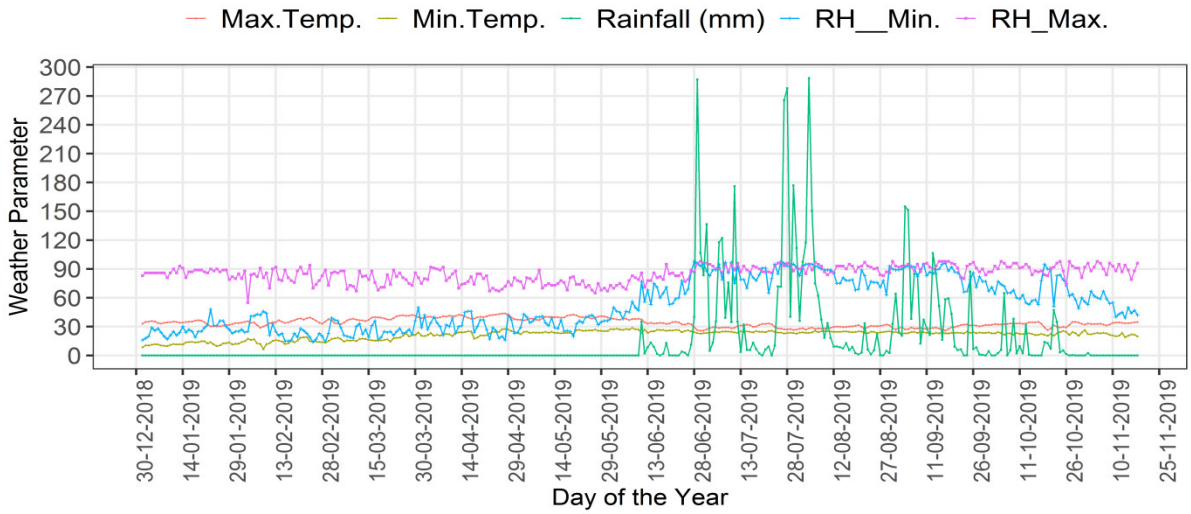


Important weather parameters recorded at IIRR, Hyderabad centre during the crop growth period in Kharif-2019 season



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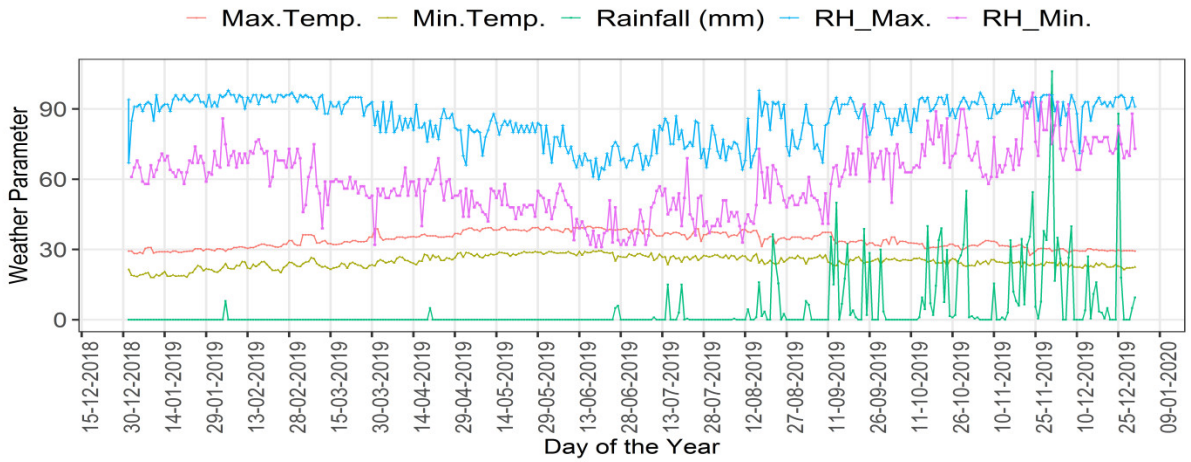

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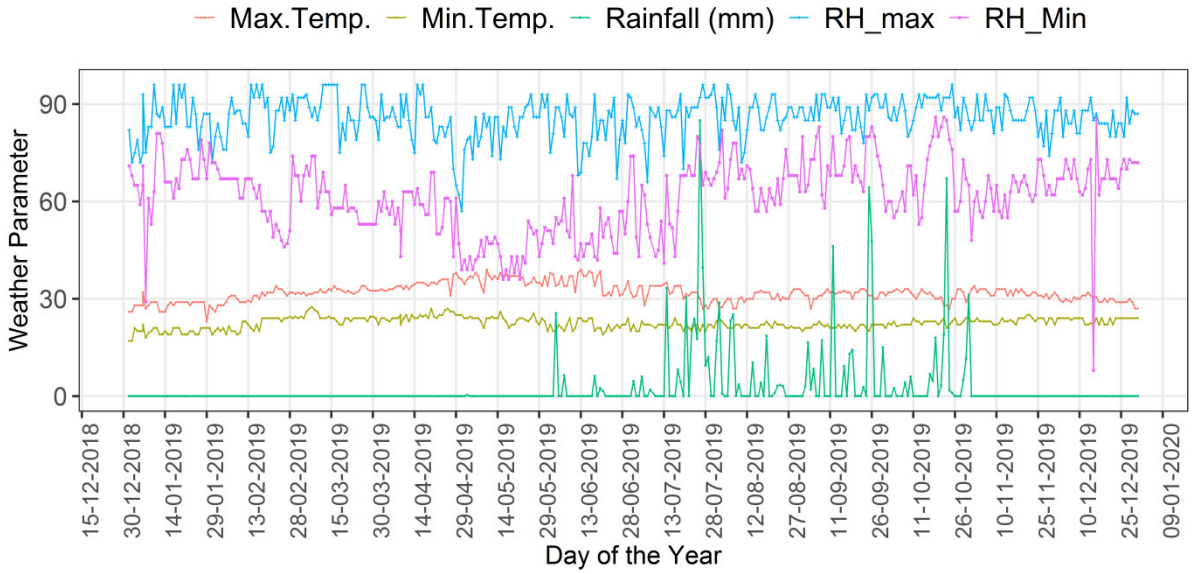

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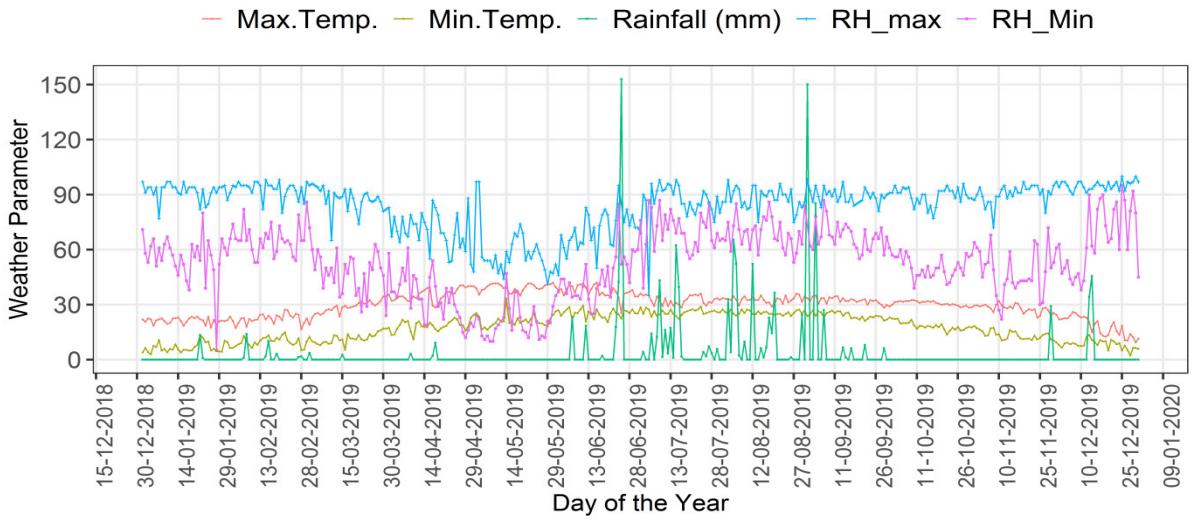

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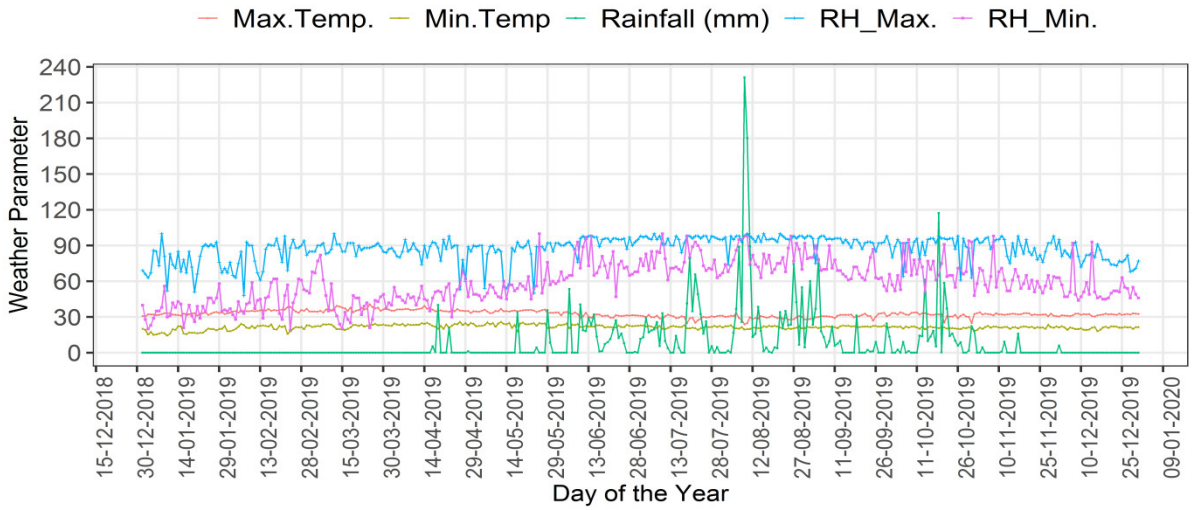

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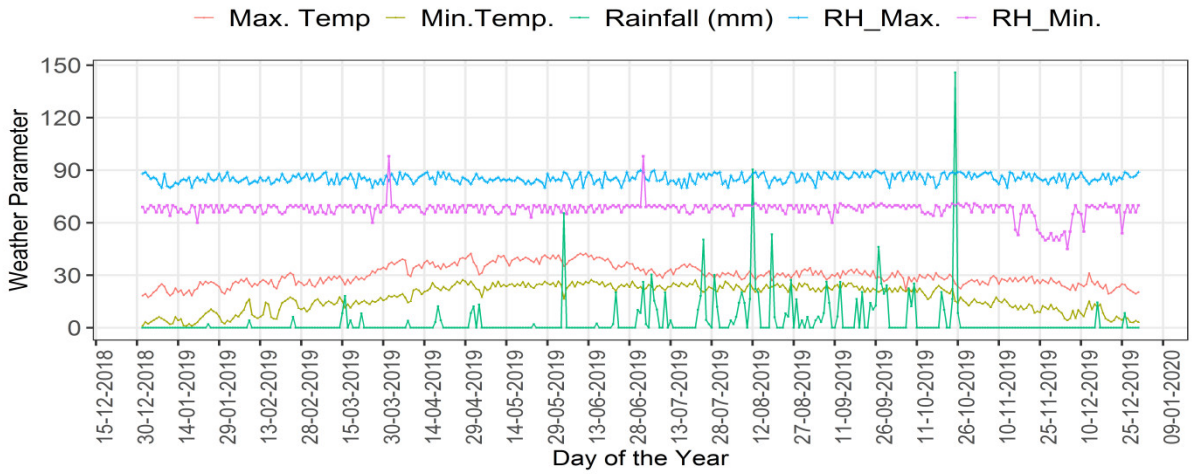

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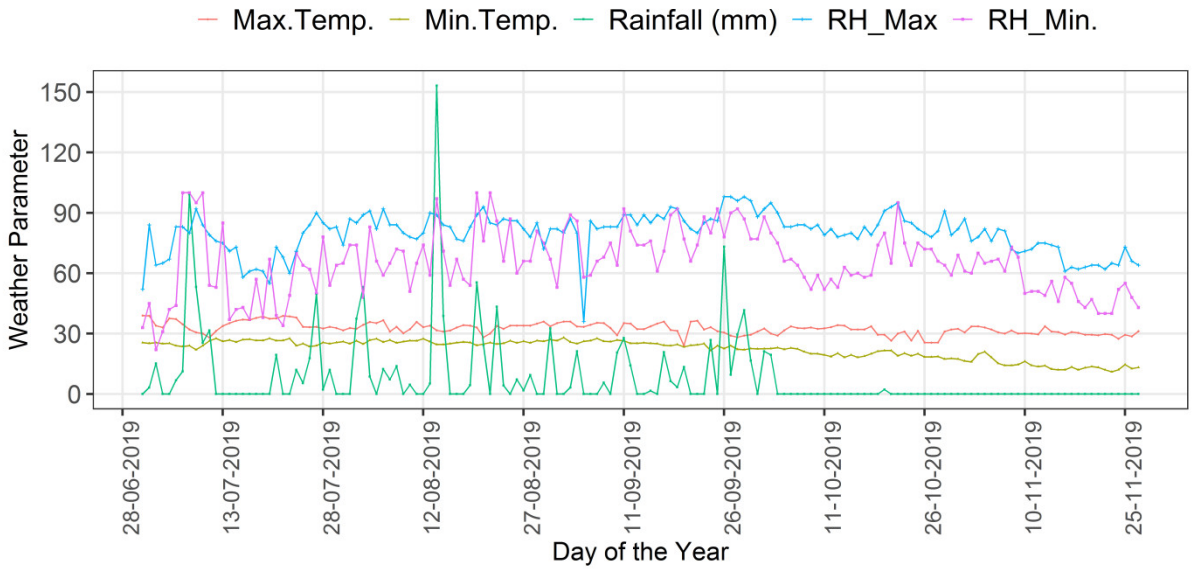
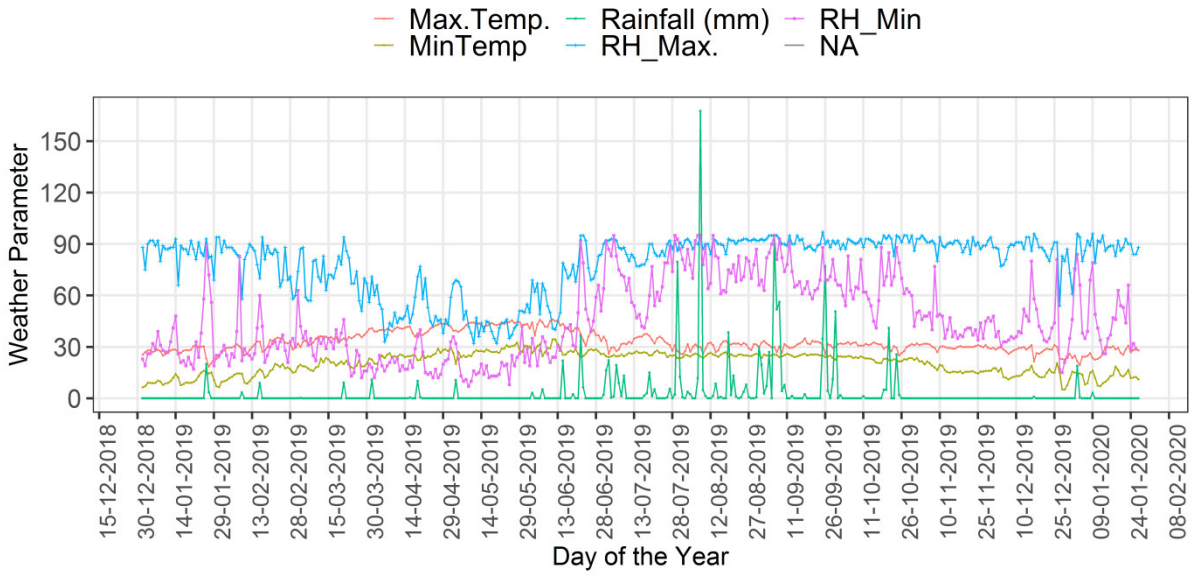
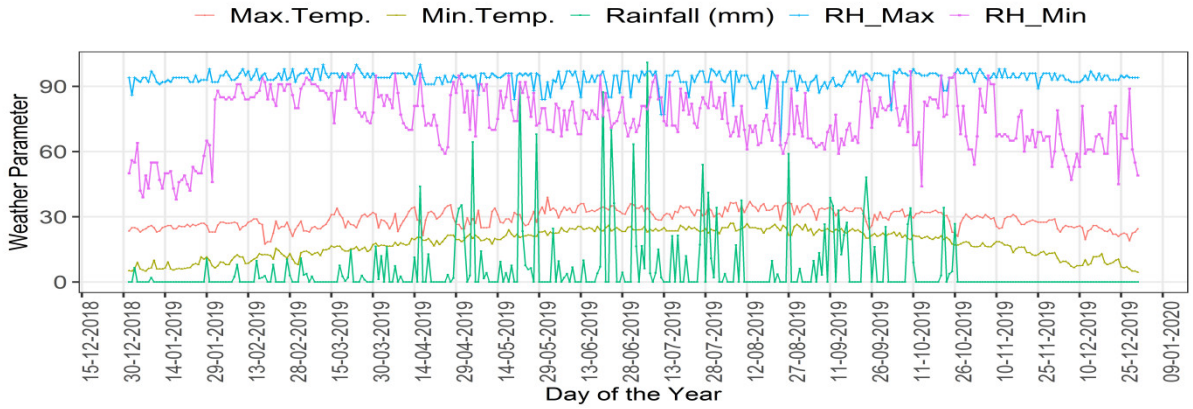


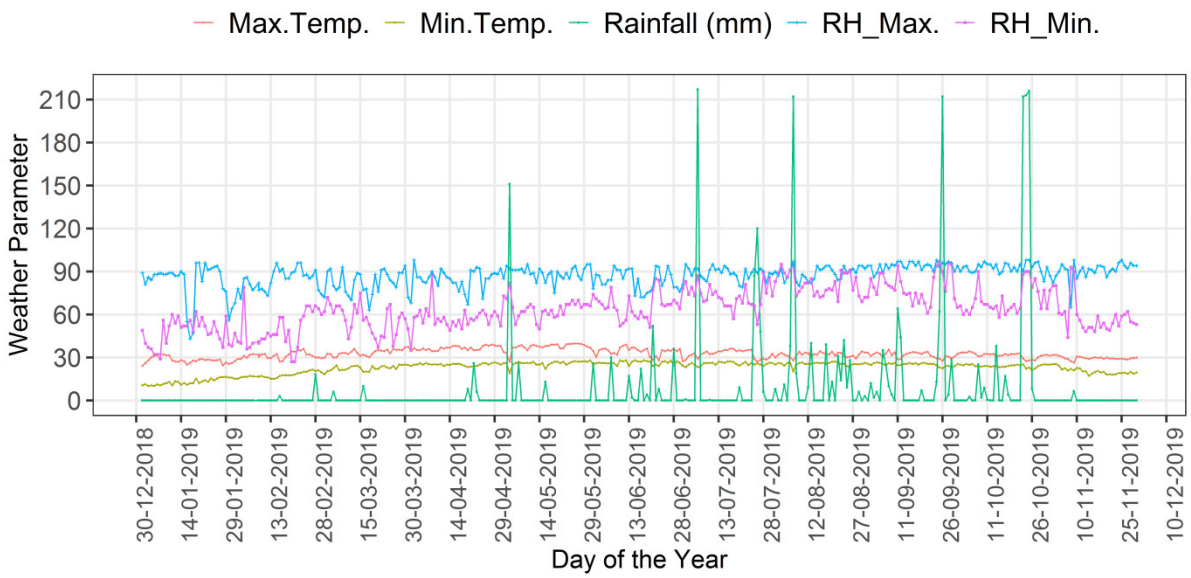
Important weather parameters recorded at Rewa centre during the crop growth period in Kharif-2019 season



Important weather parameters recorded at RPR centre during the crop growth period in Kharif-2019 season



Important weather parameters recorded at TTB centre during the crop growth period in Kharif-2019 season



Important weather parameters recorded at NRRI centre during the crop growth period in Kharif-2019 season

A P P E N D I X - II

Rice cultures of Physiology

	SUB		**HT**			**RFU**				**MAS**			**LLS**	
S.No.	**Entries**	**S.No.**	**Entries**		**S.No.**	**Entries**			**S.No.**	**Entries**		**S.No.**	**Entries**	
1	AC 1303	1	IET 28384	IVT-IME	1	IET 28240	IVT-E-DS		1	AC 1303	AVT-1-IME	1	IET 27570	IVT-SDW
2	AC 42088	2	IET 28386	IVT-IME	2	IET 28241	IVT-E-DS		2	Rashpanjor	AVT-1-IME	2	IET 27571	IVT-SDW
3	AC 38575	3	IET 28387	IVT-IME	3	IET 28242	IVT-E-DS		3	Black Gora	AVT-1-IME	3	IET 27572	IVT-SDW
4	SABITA	4	IET 28390	IVT-IME	4	IET 28243	IVT-E-DS		4	Parijat	AVT-1-IME	4	IET 27577	IVT-SDW
5	NAVEEN	5	IET 27668	IVT-IME	5	IET 28244	IVT-E-DS		5	Brahman-nakhi	AVT-1-IME	5	IET 27581	IVT-SDW
6	SWARNA SUB-1	6	IET 28393	IVT-IME	6	IET 28245	IVT-E-DS		6	AC 3577	AVT-1-IME	6	IET 27584	IVT-SDW
7	BLACK GORA	7	IET 28397	IVT-IME	7	Sahbhagidhan	IVT-E-DS		7	Mahulata	AVT-1-IME	7	IET 27586	IVT-SDW
8	BAI KANI	8	IET 28400	IVT-IME	8	IET 28246	IVT-E-DS		8	BVD 109	AVT-1-IME	8	IET 27588	IVT-SDW
9	SWARNA	9	IET 28402	IVT-IME	9	IET 28246	IVT-E-DS		9	IET 27736	AVT-1-IME	9	IET 26687	IVT-SDW
10	PARIJAT	10	IET 28403	IVT-IME	10	IET 28248	IVT-E-DS		10	IET 26861	AVT-1-IME	10	IET 27590	IVT-SDW
11	PAU 9	11	Gontra Bidhan-3	IVT-IME	11	IET 28248	IVT-E-DS		11	IET 27750	AVT-1-IME	11	IET 27592	IVT-SDW
12	BRAHMAN NAKHI	12	IET 28407	IVT-IME	12	IET 28250	IVT-E-DS		12	IET 27773	AVT-1-IME	12	IET 27595	IVT-SDW
13	MAHULATA	13	IET 28408	IVT-IME	13	Vandana	IVT-E-DS		13	IET 27772	AVT-1-IME	13	IET 27596	IVT-SDW
14	BVD 109	14	IET 28409	IVT-IME	14	IET 28251	IVT-E-DS		14	IET 27768	AVT-1-IME	14	IET 27597	IVT-SDW
15	IET 18720	15	IET 28411	IVT-IME	15	IET 28252	IVT-E-DS		15	IET 27762	AVT-1-IME	15	IET 27598	IVT-SDW
16	IET 18727	16	IET 28412	IVT-IME	16	IET 28253	IVT-E-DS		16	IET 27758	AVT-1-IME	16	IET 27559	IVT-SDW
17	IC 516009	17	IET 28417	IVT-IME	17	IET 28254	IVT-E-DS		17	IET 27737	AVT-1-IME	17	Swarnaprabha	IVT-SDW
		18	IET 28422	IVT-IME	18	Tulasi	IVT-E-DS		18	IET 27775	AVT-1-IME	18	IR-8	IVT-SDW
		19	IET 28423	IVT-IME	19	IET 28255	IVT-E-DS		19	IET 27356	AVT-1-IME			
		20	IET 28425	IVT-IME	20	IET 28256	IVT-E-DS		20	IET 27757	AVT-1-IME			
	SILICON	21	IET 28427	IVT-IME	21	US 314	IVT-E-DS		21	IET 26961	AVT-1-IME			
1	27P63	22	IET 28429	IVT-IME	22	IET 28257	IVT-E-DS		22	IET 27755	AVT-1-IME			
2	HRI-174	23	IET 28432	IVT-IME	23	IET 28258	IVT-E-DS		23	IET 27748	AVT-1-IME			
3	IIRRH-122	24	IET 27908	IVT-IME	24	IET 28259	IVT-E-DS							
4	IIRRH-131	25	IET 27876	IVT-IME	25	IET 28260	IVT-E-DS							
5	IRRH-132	26	IET 25713	IVT-IME	26	Gangavathi Ageti	IVT-E-DS							
6	JKRH-3333	27	IET 26468	IVT-IME	27	IET 28261	IVT-E-DS							
7	KRH-4	28	IET 26780	IVT-IME	28	Anjali	IVT-E-DS							
8	SB.DHAN	29	N-22	IVT-IME	29	IET 28262	IVT-E-DS							
9	US-314	30	Vandana	IVT-IME	30	Local	IVT-E-DS							

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	Telangana		

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