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Effect of weather parameters on disease incidence of summer paddy varieties: Bhogawati and Phule Radha

PB Suryavanshi, NV Kashid, KA Rewale and SS Misal

Abstract
The present investigation entitled "Effect of weather parameters on disease incidence of summer paddy varieties" was carried out during summer, 2014 at Agricultural Research Station farm, Vadgaon Maval, Tal- Maval, Dist- Pune. The field experiment was laid out in a split plot design with three replications. There were sixteen treatment combinations comprising of four varieties IET-13549 (Bhogawati) and RDN-99-1 (Phule Radha) as main plot treatments and four fertilizer levels (F1-75% RDF through straight fertilizers, F2-100% RDF through straight fertilizers, F3-125% RDF through straight fertilizers and F4-RDF through Urea DAP form(57:29:00)+50 KgK2O)as sub plot treatments. The gross and net plot size were 2.95 m x 2.95 m and 2.55 m x 2.55 m, respectively. A spacing of 15-25 cm x 15-25 cm was adopted. Disease incidence and per cent disease intensity was lower with more with IET-13549 (Bhogawati) and RDN-99-1 (Phule Radha).Disease incidence and per cent disease intensity was more with fertilizer levels of 75% RDF through straight fertilizers and lower with fertilizer through Urea DAP briquette form(57:29:00)+50KgK_2O. There was positive correlation between maximum temperature, morning relative humidity, BSS and canopy temperature and incidence of sheath rot and scald but negative correlation with minimum temperature, evening relative humidity, growing degree day and Rust incidence was not observed during the period of investigation.

Keywords: Summer, fertilizer, weather, disease

Introduction
Rice belongs to the genus *Oryza* and family *Poaceae*. It has two cultivated and 22 wild species. The cultivated species are *Oryza sativa* and *Oryza glaberrima*. *Oryza sativa* is grown all over the world while *Oryza glaberrima* has been cultivated in West Africa for the last 3500 years. From an early history in the Asian areas rice has spread and is now grown on all continents except Antarctica. Being able to grow in this wide spectrum of climates is the reason that why rice is one of the most widely eaten foods of the world. About 85% of the rice produced in the world is used for direct human consumption. Rice can also been found in cereals, snack foods, brewed beverages, flour, oil, syrup and religious ceremonies. Global demand for food is rising because of population growth, increasing affluence and changing dietary habits. The UN/FAO forecasts that global food production will need to increase by over 40% by 2030 and 70% by 2050. Yet globally, water is anticipated to become scare and there is increasing competition for land, putting added pressure on agricultural production. In addition, climate change will reduce the reliability of food supply through altered weather patterns and increased pressure from pests and diseases. Rice along with wheat from the bedrock of Indian food security and to meet the country's stated goal of ensuring food for all, farmer will have to produce more rice from lesser land, using less water, energy and other inputs and keeping in harmony with the fragile environment. For obtaining the higher summer paddy production study of crop in relation to weather condition and pest and diseases infestation is very necessary. As 2 ^{0}C increase in air temperature could decreased rice yield by about 0.75 tons ha^{-1} in high yielding area. There is 5% decrease in rice yield for every 1 ^{0}C rise in temperature above 32 ^{0}C. Attack of pest and disease is totally depends on weather condition and host abundance (Khan and Ram Murthy, 2004) have reported that, minimum temperature and rainfall had significant effect on leaf folder population structure in paddy.

Material and Methods
Details of the experimental material
Experimental site
The field experiment was conducted during *summer*, 2014 at Agricultural Research Station Farm, Vadgaon Maval, Tal. Maval, Dist. Pune.

Soil
The topography of the experimental field was uniform and leveled. The soil was clay loam in texture with a depth upto60 cm. In order to know the physical and chemical properties of the experimental soil, representative composite samples from 0 to 30 cm depth were taken from randomly selected spots in zig-zag fashion before transplanting with the help of screw auger. These samples were mixed together and air-dried under shade. A representative soil sample was prepared for determining physical and chemical properties of the experimental soil.

Climatic conditions
General
Agroclimatically, Vadagaon Maval comes under the sub montane zone. Geographically, Vadagaon Maval is situated on elevation of 670 m above mean sea level on 18.74^{0}North latitude and 73.64^0 East longitudes. The average annual rainfall of Vadagaon Maval is 1260 mm, out of the total annual precipitation, 75 per cent is received during the period from June to September from South-West monsoon, while the remaining quantity is received mostly in the month of October and November from North-East monsoon. The annual average maximum and minimum temperature ranged between 24 ^{0}C to 36 ^{0}C and 9 ^{0}C to 22 ^{0}C, respectively. The relative humidity during morning and evening ranged between 83 and 91 per cent, respectively

Meteorological observations
Growing Degree Day requirement
The GDD was computed by summing the daily mean temperature recorded during growing period by following formula

GDD = (Tmax+ Tmin) /2 –Base Temperature

Base temperature for paddy = 10 ^{0}C

Maximum temperature (^{0}C)
The maximum temperature was recorded with the help of maximum thermometer kept in Single Stevenson's screen from observatory.

Minimum temperature (^{0}C): The minimum temperature was recorded with the help minimum thermometer kept in Single Stevenson's screen from observatory.

Humidity (%): The humidity was recorded with the help of dry bulb and wet bulb thermometer kept i Single Stevenson's screen from observatory.

Bright sunshine (hrs.): Bright sunshine hours were recorded with the help of bright campbell stokes sunshine recorder from observatory.

Canopy temperature (^{0}C): The infrared thermometer was used to measure the canopy temperature remotely.

Theory of operation: It detects minute difference between crop canopy and surrounding air temperature. Telatemp (model AG-42) was used for measurement of canopy temperature and canopy-air temperature differential in this experiment.

Working principle: The energy flux emitted by an object is a function of its absolute temperature. The infrared thermometer senses long wave radiation emitted by the object and converts this value to a temperature scale according to Stefan's Law:

$E = \varepsilon\sigma T^4$

Where,

E = Energy flux, Wm^{-2}

ε = Emmissitivity of the body

σ = Stefan Boltzman constant = (5.67× 10^8 Wm^{-2} K^{-4}),

T= Absolute Temperature of the body, ^{0}K

Measuring temperature: To take temperature measurement, the instrument is held by grip, which promptly "come to life' as evidenced by the digital display.

Rainfall (mm): Rainfall was recorded with the help of automatic type of rain gauge from observatory.

Table 1: Details of treatment with their symbol

Sr. No.	Treatment Details	Symbol used
A.	**Main Plot treatments :Varieties(V)**	
3	IET-13549 (Bhogawati)	V_3
4	RDN-99-1 (PhuleRadha)	V_4
B.	**Sub Plot treatments:fertilizer levels (F)**	
1	75% RDF through straight fertilizer	F_1
2	100%RDF (100:50:50) through straight fertilizer	F_2
3	125%RDF through straight fertilizer	F_3
4	Fertilizer through Urea DAP briquette form (59:29:00)+50Kg K_2O ha^{-1}	F_4

Table 2: Treatment combinations (16)

1	V_3F_1	5	V_4F_1
2	V_3F_2	6	V_4F_2
3	V_3F_3	7	V_4F_3
4	V_3F_4	8	V_4F_4

Table 3: Preparation of field layout

	The other details of layout are given below:		
1.	Name of crop	:	Paddy
2.	Varieties	:	As per treatments
3.	Season	:	*Summer*, 2014
4.	Design	:	Split plot
5.	No. of Replications	:	Three
6.	Treatments	:	Eight
7.	Spacing	:	15-25 cm x 15-25 cm
8.	Plot size	:	Gross: 2.95 m x 2.95 m Net: 2.55 m x 2.55 m
9.	Place of research work	:	A.R.S. farm, Vadgaon Maval, Tal. Maval, Dist. Pune.
10.	Commencement of research work	:	Summer, 2014
11.	Transplanting date	:	2/1/2014
12.	Fertilizer	:	100:50:50 NPK kg ha^{-1}

Disease Observation

Blast

Blast disease of paddy caused by *Magnaporthe grisea* (*Pyricularia grisea*). The lesions usually start near the leaf tips or leaf margins or both, and extend down the outer edge(s). Young lesions are pale green to grayish green, later turning spindle in shape and gray at center with dark brown margin. In very susceptible varieties, lesions may extend to the entire leaf length into the leaf sheath. Kresek or seedling blight causes wilting and death of the plants.

The disease intensity was assessed by recording severity of leaf blast by adopting 0-9 scale. In each treatment plot randomly selected five plants were assessed. Per cent disease incidence was calculated using following formula.

$$\text{Per cent incidence} = \frac{\text{Total numerical rating}}{\text{Total number of observations x maximum grade}} \times 100$$

$$\text{PDI} = \frac{\text{Number of diseased plant leaves}}{\text{Total number of plant leaves observed}}$$

The observations were recorded at seedling and tillering stages.

Blast recording scale:	
0	No lesions observed
1	Small brown specks of pinpoint size or larger brown specks without sporulating center
3	Small, roundish to slightly elongated necrotic sporulating spots, about 1-2 mm in diameter with a distinct brown margin or yellow halo
5	Narrow or slightly elliptical lesions, 1-2 mm in breadth, more than 3 mm long with a brown margin
7	Broad spindle-shaped lesion with yellow, brown, or purple margin
9	Rapidly coalescing small, whitish, grayish, or bluish lesions without distinct margins

Sheath Rot

The disease is caused by *Sarocladium oryzae*. Oblong or irregular brown to grey lesions on the leaf sheath near panicle. The lesions sometimes coalescing to prevent emergence of panicle.

Scale for sheath rot

0	No incidence
1	Less than 1%
3	1-5%
5	6-25%
7	26-50%
9	51-100%

The observations were recorded at milk stage, dough stage and mature grain stages.

Leaf scald

Leaf scald of paddy is caused by *Microdochium oryzae*. The lesions occurs mostly near leaf tips, but sometimes starts at the margin of the blade and develops into large ellipsoid areas encircled by dark-brown, narrow bands accompanied by a light-brown halo.

Scale for leaf scald

0	No incidence
1	Less than 1% (apical lesions)
3	1-5% (apical lesions)
5	6-25% (apical and some marginal lesions)
7	26-50% (apical and marginal lesions)
9	51-100% (apical and marginal lesions)

The disease observations were recorded at booting, heading, milk stage and dough stages.

Result and Discussion

The present investigation entitled "Performance of summer paddy varieties under fertilizer levels in relation to weather parameters" was carried out during *summer*, 2014 at Agricultural Research Station farm, Vadgaon Maval, Tal- Maval, Dist- Pune.

Incidence of blast, sheath rot and scald diseases in different varieties during *summer* season

The incidence of blast was not noticed during *summer* season. The incidence and intensity of sheath rot and scald disease was not observed. The incidence and intensity of sheath rot and scald diseases were lower in Bhogawati and Phule Radha (Table 4).

The incidence and intensity of sheath rot and scald diseases were lower in fertilizer level 125% RDF through straight fertilizers. After that, it increased from 75% RDF through straight fertilizers, 100% RDF through straight fertilizers and fertilizer through Urea DAP briquette form+50 Kg$K_2O$$ha^{-1}$

Table 4: Incidence of blast, sheath rot and scald diseases in different treatments during summer season

Treatment		Percent incidence					Percent disease intensity				
	Disease	45DAT	60DAT	75DAT	90DAT	At harvest	45DAT	60DAT	75DAT	90DAT	At harvest
V3F1	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	5.3	5.4	6.6	7.6	0	3.5	3.6	4.3	5.2
	Scald	0	5.1	5.3	6.5	7.7	0	0	3.7	3.9	6.7
V3F2	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	5.6	5.4	6.6	6.6	0	3.8	5.9	6.9	6.6
	Scald	0	4.7	5.4	6.2	6.7	0	0	3.6	4.3	4.9
V3F3	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	4.7	6.4	7.3	8.6	0	4.8	5.2	5.6	6.4
	Scald	0	5.7	6.8	7.6	8.4	0	3.2	3.5	4.5	7.8
V3F4	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	5.4	6.3	6.5	7.7	0	3.3	4.7	5.2	6.1
	Scald	0	5.4	5.5	6.8	7.7	0	3.5	3.6	6.4	6.8
V4F1	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	5.9	6.2	7.3	7.5	0	4.3	4.9	5.3	5.7
	Scald	0	5.7	6.5	7.7	8.3	0	3.5	4.9	5.8	6.9
V4F2	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	6.8	6.5	7.3	8.0	0	4.1	4.8	5.8	6.2
	Scald	0	5.3	7.5	8.6	9.4	0	3.9	5.4	6.7	7.8
V4F3	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	6.3	7.7	8.8	9.2	0	3.6	5.2	6.1	5.8
	Scald	0	6.5	7.3	8.5	9.6	0	4.1	4.2	6.6	7.6
V4F4	Blast	0	0	0	0	0	O	0	0	0	0
	S.rot	0	4.3	6.9.	7.8	8.6	0	2.1	4.2	5.3	4.1
	Scald	0	4.2	6.5	6.4	7.0	0	0	5.2	5.9	6.5

Correlation between weather parameters and incidence of diseases

Correlation of incidence of sheath rot with weather parameters at harvest revealed significant positive correlation with T max(r = 0.522*), RH-I (r = 0.662*), BSS (r = 0.457) and canopy temperature (r = 0.140) indicated increase in Tmax, RH-I, BSS and canopy temperature increased infestation of sheath rot. Further, significant negative correlation was noticed with Tmin(r= -0.726*), RH-II (r = -0.505*) and GDD (r = -0.854**) indicated increase in Tmin, RH-II and GDD decreased infestation of sheath rot.

b) Incidence of scald

Correlation analysis of incidence of scald with weather parameter with different varieties presented in Table 5.

Correlation 45 DAT revealed significant positive correlation between leaf scald incidence and Tmax (r= 0.824**), RH-I (r= 0.756*), BSS (r= 0.522*), canopy temperature (r=0.735*) and GDD (r= 0.426) indicated that increase in Tmax, RH-I, canopy temperature and BSS levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = 0.536*) and RH-II (r = -0.334) indicated increase in Tmin and RH-II decreased infestation of scald.

Correlation of incidence of scald with weather parameters at 60 DAT revealed significant positive correlation with T max (r= 0.924**), RH-I (r = 0.442), BSS (r= 0.478) and canopy temperature (r= 0.569*) indicated increase in T max, RH-I, BSS, and canopy temperature increased infestation of scald. Significant negative correlation of scald with, T min (r = -0.864**), RH-II (r = -0.160) and GDD (r= -0.668*) showed that increase in T min, RH-II and GDD decreased infestation of disease.

On variety Bhogawati

a) Incidence of sheath rot

Correlation analysis of incidence of sheath rot with weather parameter with different varieties is presented in Table 5.

Correlation of incidence of sheath rot with weather parameters at 45 DAT revealed significant positive correlation with T max(r =0.632*), RH-I (r = 0.856**), BSS (r = 0.816**) and canopy temperatur(r = 0.569*) indicated increase in, Tmax, RH-I, BSS and canopy temperature increased infestation of sheath rot and significant negative correlation with Tmin (r = -0.305), RH-II (r = -0.617*) and GDD (r = -0.962**) was observed indicated increase in Tmin, RH-II and GDD decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at 60 DAT revealed significant positive correlation with T max (r = 0.775*), RH-I (r = 0.304), canopy temperature (r = 0.758*) indicated increase in these weather elements increased infestation of sheath rot. Further, significant negative correlation was noticed with Tmin (r = -0.698*), RH-II (r = -0.586*), BSS (r = -0.665*) and GDD (r= -0.878**) indicated increase in Tmin, RH-II, BSS and GDD decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at 75 DAT revealed significant positive correlation with Tmax (r = 0.634*), RH- I (r = 0.863**), BSS (r= 0.598*) and canopy temperature (r = 0.488), indicated increase in these weather elements increased infestation of sheath rot. However, significant negative correlation was recorded with Tmin(r = -0.867**), RH-II (r = -0.136) and GDD (r = -0.965**) indicated increase in T min, RH-II, and GDD decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at 90 DAT revealed significant positive correlation with Tmax (r= 0.714*), Tmin(r= 0.775*), BSS (r = 0.225) and canopy temperature (r = 0.456) indicated increase in Tmax, Tmin, BSS and canopy temperature increased infestation of sheath rot. Further, significant negative correlation was noticed RH-I(r= -0.569*), RH-II(r= -0.432) and GDD (r = -0.756*) indicated increase in RH-I, RH-II and GDD decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at harvest revealed significant positive correlation with T max (r = 0.823**), RH-I (r = 0.466), BSS (r = 0.996**), canopy temperature (r = 0.478) and GDD (r= 0.863**) indicated increase in Tmax, RH-I, BSS, canopy temperature and GDD increased infestation of sheath rot. Further, significant negative correlation was noticed with Tmin (r= -0.741*) and RH-II (r = -0.756*) indicated increase in Tmin and RH-II decreased infestation of sheath rot.

b) Incidence of scald

Correlation analysis of incidence of scald with weather parameter at different varieties is presented in Table 5.

Correlationat 45 DAT revealed significant positive correlation between leaf scald incidence and Tmax (r= 0.738*), RH-I (r=0.825**), BSS (r= 0.478) and canopy temperature (r=0.579*) indicated that increase in Tmax, RH-I and canopy temperature levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.258), RH-II (r = -0.658*) and GDD (r= -0.654*) indicated increase in Tmin, RH-II and GDD decreased infestation of scald.

Correlation of incidence of scald with weather parameters at 60 DAT revealed significant positive correlation with Tmax (r= 0.878**), T min (r = 0.455), RH-I (r = 0.753*), BSS (r= 0.756*) and canopy temperature (r= 0.489) indicated increase in Tmax, Tmin, RH-I, BSS and canopy temperature increased infestation of scald. Significant negative correlation of scald with RH-II (r = -0.361) and GDD (r= -0.861**) showed that increase in RH-II and GDD decreased infestation of disease.

Correlationat 75 DAT revealed significant positive correlation between leaf scald incidence and T max (r= 0.674*), RH-I (r= 0.669*), BSS (r= 0.458), canopy temperature (r= 0.699*) and GDD (r= 0.522*) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.477) and RH-II (r = -0.879**) indicated increase in T min and RH-II decreased infestation of scald.

Correlation at 90 DAT revealed significant positive correlation between leaf scald incidence and T max (r = 0.715*), RH-I (r= 0.559*) and canopy temperature (r = 0.236) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.469), RH-II (r = -0.893**), BSS (r = -0.459) and GDD (r= -0.864**) indicated increase in Tmin, RH-II, BSS and GDD decreased infestation of scald.

Correlation at harvest revealed significant positive correlation between leaf scald incidence with Tmax (r = -0.871**), BSS (r= 0.589*) and canopy temperature (r = 0.662*) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.689*), RH-I (r = -0.449), RH-II(r = -0.478) and GDDB(r = -0.458) indicated increase in Tmin, RH-I, RH-II and GDD decreased infestation of scald.

Table 5: Correlation between weather parameters and diseases of paddy on variety IET-13549 (Bhogawati)

	Sheath rot					Scald				
	BHOGAWATI									
Weather Parameres	**45 DAT**	**60 DAT**	**75 DAT**	**90 DAT**	**At harvest**	**45 DAT**	**60 DAT**	**75 DAT**	**90 DAT**	**At harvest**
Tmax	0.632*	0.775*	0.634*	0.714*	0.823**	0.738*	0.878**	0.674*	0.715*	0.871**
Tmin	-0.305	-0.698*	-0.867**	0.775*	-0.741*	-0.258	0.455	-0.477	-0.469	-0.689*
RH-I	0.856**	0.304	0.863**	-0.569*	0.466	0.825**	0.753*	0.669*	0.559*	-0.449
RH-II	-0.617*	-0.586*	-0.136	-0.432	-0.756*	-0.658*	-0.361	-0.879**	-0.893**	-0.478
BSS	0.816**	-0.665*	0.598*	0.225	0.996**	0.478	0.756*	0.458	-0.459	0.589*
Canopy temp.	0.569*	0.758*	0.488	0.456	0.478	0.579*	0.489	0.699*	0.236	0.662*
GDD	-0.962**	-0.878**	-0.965**	-0.756*	0.863**	-0.654*	-0.861**	0.522*	-0.864**	-0.458

* significant at 5% levels

** significant at 1% levels

On variety Phule Radha

a) Incidence of sheath rot

Correlation analysis of incidence of sheath rots with weather parameter at different varieties is presented in Table 6.

Correlation of incidence of sheath rot with weather parameters at 45 DAT revealed significant positive correlation with Tmax (r=0.738*), RH-I (r = 0.826**), BSS (r = 0.904**) and canopy temperature(r = 0.896**) indicated increase in, Tmax, RH-I, BSS and canopy temperature increased infestation of sheath rot and significant negative correlation with Tmin (r = -0.662*), RH-II (r = -0.738*) and GDD (r = -0.778*) was observed indicated increase in Tmin, RH-II and GDD decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at 60 DAT revealed significant positive correlation with Tmax (r = 0.832**), BSS (r= 0.754*), canopy temperature (r = 0.587*) and GDD (r= 0.478) indicated increase in these weather elements increased infestation of sheath rot. Further, significant negative correlation was noticed with Tmin(r = -0.589*), RH-I (r = -0.968**) and RH-II (r = -0.886**) indicated increase in Tmin, RH-I and RH-II decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at 75 DAT revealed significant positive correlation with RH- I (r = 0.663*), BSS (r= 0.734*) and canopy temperature (r = 0.668*) indicated increase in these weather elements increased infestation of sheath rot. However, significant negative correlation was recorded with Tmax (r = -0.718*), Tmin (r = -0.678*), RH-II (r = -0.426) and GDD (r = -0.554*) indicated increase in Tmax, T min, RH-II, and GDD decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at 90 DAT revealed significant positive correlation with Tmax (r= 0.624*), RH-I (r= 0.699*), BSS (r = 0.678*) and canopy temperature(r = 0.345) indicated increase in Tmax, RH-I, BSS and canopy temperature increased infestation of sheath rot. Further, significant negative correlation was noticed Tmin (r= -0.589), RH-II (r= -0.891**) and GDD (r = -0.456) indicated increase in Tmin, RH-II and GDD decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at harvest revealed significant positive correlation with T max (r = 0.863**), RH-I (r = 0.874**) and canopy temperature (r = 0.245) indicated increase in Tmax, RH-I and canopy temperature increased infestation of sheath rot. Further, significant negative correlation was noticed with Tmin (r= -0.745*), RH-II (r = -0.536*), BSS (r = -0.458) and GDD (r= -0.654*) indicated increase in Tmin, RH-II and GDD decreased infestation of sheath rot.

b) Incidence of scald

Correlation of incidence of scald with weather parameter at different varieties is presented in Table 36.

Correlation at 45 DAT revealed significant positive correlation between leaf scald incidence and Tmax (r= 0.674*), BSS (r= 0.779*) and canopy temperature (r=0.569*) indicated that increase in Tmax, BSS and canopy temperature levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.598*), RH-I (r = -0.782*), RH-II (r= -0.547*) and GDD (r= -0.698*) indicated increase in Tmin, RH-I, RH-II and GDD decreased infestation of scald.

Correlation of incidence of scald with weather parameters at 60 DAT revealed significant positive correlation with RH-I (r = 0.564*), BSS (r= 0.354) and canopy temperature (r= 0.564*) indicated increase in RH-I, BSS and canopy temperature increased infestation of scald. Significant negative correlation of scald with Tmax (r= -0.889**), T min (r = -0.725*), RH-II (r = -0.456) and GDD (r= -0.996**) showed that increase in Tmax, Tmin, RH-II and GDD decreased infestation of disease.

Correlation at 75 DAT revealed significant positive correlation between leaf scald incidence and T max (r= 0.986**), RH-I (r= 0.635*), BSS (r= 0.452) and canopy temperature (r= 0.764*) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.775*), RH-II (r = -0.558*) and GDD (r= -0.634*) indicated increase in Tmin and RH-II and GDD decreased infestation of scald.

Correlation at 90 DAT revealed significant positive correlation between leaf scald incidence and T max (r = 0.744*), RH-I (r= 0.586*), canopy temperature (r = 0.536*) and GDD (r= 0.436) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.658*), RH-II (r = -0.867**) and BSS (r = -0.456) indicated increase in Tmin, RH-II and BSS decreased infestation of scald.

Correlation at harvest revealed significant positive correlation between leaf scald incidence with Tmax (r = 0.869**), RH-I(r = 0.665*), BSS (r= 0.365) and canopy temperature (r = 0.856**) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.457), RH-II (r = -0.456) and GDD (r = -0.664*) indicating increase in Tmin, RH-II and GDD decreased infestation of scald.

Table 6: Correlation between weather parameters and diseases of paddy on variety RDN-99-1 (PhuleRadha)

	Sheath rot					**Scald**				
	PHULE RADHA									
Weather parametrs	**45 DAT**	**60 DAT**	**75 DAT**	**90 DAT**	**At harvest**	**45 DAT**	**60 DAT**	**75 DAT**	**90 DAT**	**At harvest**
Tmax	0.738*	0.832**	-0.718*	0.624*	0.863**	0.674*	-0.889**	0.986**	0.744*	0.869**
Tmin	-0.662	-0.589*	-0.678*	-0.589*	-0.745*	-0.598*	-0.725*	-0.775*	-0.658*	-0.457
RH-I	0.826**	-0.968**	0.663*	0.669*	0.874**	-0.782*	0.564*	0.635*	0.586*	0.665*
RH-II	-0.738*	-0.886**	-0.426	-0.891**	-0.536*	-0.547*	-0.456	-0.558*	-0.867**	-0.456
BSS	0.904**	0.754*	0.734*	0.678*	-0.458	0.779*	0.354	0.452	-0.456	0.365
Canopy temp.	0.896**	0.587*	0.668*	0.345	0.245	0.569*	0.564	0.764*	0.536*	0.856**
GDD	-0.778*	0.478	-0.554*	-0.456	-0.654*	-0.698*	-0.996**	-0.634*	0.436	-0.664*

* significant at 5% levels

** significant at 1%levels

Conclusions

Disease incidence and per cent disease intensity was lower with IET-13549 (Bhogawati) and more with RDN-99-1 (Phule Radha).Disease incidence and per cent disease intensity was more with fertilizer levels of 75% RDF through straight fertilizers and lower with fertilizer through Urea DAP briquette form (57:29:00)+50KgK_2O. There was positive correlation between maximum temperature, morning relative humidity, BSS and canopy temperature and incidence of sheath rot and scald but negative correlation with minimum temperature, evening relative humidity, growing degree day and Rust incidence was not observed during the period of investigation.

References

1. Abe I, Ono K, Toriyama K, Wada J. Ecological studies on the establishment of regionality in early planting culture and great harvest of rice plant (translated title, English summary). Part I. Relation between the regionality of climate and growth of rice plant in Aomori Prefecture, Nogyo Kosho Agricultural Meteorology Journal. I960; l6:99-105.

2. Bonman JM, Estrada BA, Kim CK, Ra DS, Lee EJ. Assessment of blast disease and yield loss in susceptible and partially resistant rice cultivars in two irrigated lowland environments. Plant Disease. 1991; 75:462-466.
3. Chiu TF, Lina S, Hsu SC. Studies on nutrient absorption of rice plants in Taiwan. II, Nutrient absorption by Japonica and indica varieties of rice in relation to temperature. Taiwan Agricultural Research Journal. 196I; 10(1):7-20.
4. Fujiwara A, Ishida H. Nutrio-physiological studies on low temperature damaged rice plants. 3. Effects of soil and air temperature or day and night temperature treatment on growth and nutrioht uptake of rice plants at the highest tillering stage. Soil Science and Plant Nutrition. 1963; 9(6):38.
5. Huda AKS, Spooner-Hart R, Murray G, Hind-Lanoiselet T, Jagannathan R, Khan SA *et al*. Climate related agricultural decision making with particular reference to plant protection. J. Mycol. Pl. Path. 2005; 35:513-520.
6. Matsushima S, Tsunoda K. Analysis of developmental factors determining yield and application to yield prediction and culture improvement of lowland rice. XLIX. Effects of irrigation water temperature and its daily range in different stages upon the growth, grain yield, and constitutional factors in rice plants. Crop Science Society of Japan Proceedings. 1959; 27:357-358.
7. Munakata K. Effects of temperature and light on the reproductive growth and ripening of rice. In: Proc Symp.-sium on Rice and Climate. IRRI, Los Banos. 1976, 187-210.
8. Nishiyama I. Effect of temperature on the vegetative growth of rice plants. In: Proc Symp. on Rice and Climate. IRRI Los Banos, 1976, 159-185.
9. Nuttonson MY. Rice culture and rice-climate relationship with special reference to the United States rice areas and their latitudinal and thermal analogues in other countries, Washington, D.C., American Institute of Crop Ecology, I965.
10. Satoh Y. Relations between constituents of rice yields and meteorological factors. Agricultural Meteorology Journal Japan. 1964; 19(3):85-88.
11. Suzuki S, Moroyu H. Effect of high-night temperature treatment on the growth of rice plant with special reference to its nutritional condition. Japan Chugoku Agricultural Experiment Station, Bulletin A, 1962; 8:269-290.
12. Yamakawa Y. Observations on air, water, and soil temperatures in paddy field and carbon black powder test as a method of lowering the field temperatures in Malaya (translated title, English summary). Journal of Agrometerology. I960; l6:106-110.
13. Yoshida S, Parao. Tropical climate and its influence on rice. IRRI Research Paper Series 1978; 20:7.