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Effect of weather parameters on disease incidence of summer paddy varieties: Indrayani and Phule Samruddhi

PB Suryavanshi, NV Kashid, KA Rewale and SG Mundhe

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 Eight treatment combinations comprising of two varieties VDN-3-51-18 (Indrayani), VDN-99-29 (Phule Samruddhi 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 VDN-99-29 (Phule Samruddhi) followed by VDN-3-51-18 (Indrayani). 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 upto 60 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
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 camp bell 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)**	
1	VDN-3-51-18 (Indrayani)	V_1
2	VDN-99-29 (Phule Samruddhi)	V_2
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 (08)

1	V_1F_1	5	V_2F_1
2	V_1F_2	6	V_2F_2
3	V_1F_3	7	V_2F_3
4	V_1F_4	8	V_2F_4

Table 3: Preparation of field layout

	The plan 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 Phule Samruddhi followed by Indrayani, (Table5).

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 KgK_2O ha^{-1}

Table 5: Incidence of blast, sheath rot and scald diseases in different treatments during summer season

Treatment		Per cent incidence					Per cent disease intensity				
	Disease	45 DAT	60 DAT	75 DAT	90 DAT	At harvest	45 DAT	60 DAT	75 DAT	90 DAT	At harvest
V_1F_1	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	3.1	4.7	5.7	5.6	0	1.3	2.3	3.6	3.6
	Scald	0	2.5	3.6	4.7	5.5	0	0	1.2	2.1	4.0
V_1F_2	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	4.0	4.8	5.6	6.7	0	2.1	2.4	5.3	5.8
	Scald	0	1.9	3.4	5.2	6.7	0	0	1.5	3.1	4.2
V_1F_3	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	3.9	4.6	6.8	6.5	0	1.5	3.1	3.6	3.7

	Scald	0	2.9	4.1	5.2	6.6	0	0	2.6	4.1	4.7
V_1F_4	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	0	4.6	5.2	5.8	0	0	2.7	3.1	3.4
	Scald	0	2.3	4.1	5.1	5.7	0	0.4	2.1	3.6	3.8
V_2F_1	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	0	2.2	3.3	3.5	0	0	0.6	1.5	1.3
	Scald	0	1.7	2.5	3.7	4.3	0	0.3	1.2	1.7	2.3
V_2F_2	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	1.8	2.5	3.3	3.0	0	0.4	1.4	1.5	1.3
	Scald	0	0	1.0	2.5	2.7	0	0	0.3	1.2	1.3
V_2F_3	Blast	0	0	0	0	0	0	0	0	0	0
	S.rot	0	2.0	2.5	3.7	4.0	0	1.4	1.7	2.8	4.2
	Scald	0	3.0	3.3	4.5	4.6	0	1.3	1.7	2.8	1.5
V_2F_4	Blast	0	0	0	0	0	O	0	0	0	0
	S.rot	0	2.0	2.4	2.8	3.2	0	0.6	1.4	2.1	3.1
	Scald	0	1.0	2.8	3.0	3.2	0	0.3	0.8	1.6	1.8

Correlation between weather parameters and incidence of diseases

Correlation analysis of weather parameters and incidence of diseases on paddy is given as following:

On variety Indrayani

a) Incidence of sheath rot

Correlation analysis of incidence of sheath rot with weather parameter with different varieties The data releved is presented in Table 6 is given as follows:

Correlation analysis of incidence of sheath rot with weather parameters at 45 DAT revealed significant positive correlation with RH-I (r=0.504*), BSS (r = 0.785*) and canopy temperature (r = 0.962**) indicated increase in RH-I, BSS and canopy temperature increased infestation of sheath rot and significant negative correlation with Tmax (r = -0.946**), Tmi (r = -0.086**), GDD (r = -0.851**) and RH-II (r=0.816**) was observed indicated increase in T max, T min ,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 = 0.862**), BSS (r =0.904**) and canopy temperature (r = 0.522*) indicated increase in BSS increased infestation of sheath rot. Further, significant negative correlation was noticed with Tmin (r = -0.962**) GDD(r = -0.899**) and RH-I (r = -0.418) indicated increase in Tmin, RH-II and GDD decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at 75 DAT revealed significant positive correlation with T max (r = 0.818**), BSS (r = 0.454) and canopy temperature (r = 0.620*) indicated increase in these weather elements increased infestation of sheath rot. However, significant negative correlation was recorded with T min (r = -0.865**), RH-II (r = -0.134) and GDD (r = -0.760*) 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 T max (r = 0.832**), BSS (r = 0.636*), canopy temperature (r = 0.523*) and GDD(r = 0.825**) indicated increase in Tmax, BSS, canopy temperature and GDD increased infestation of sheath rot. Further, significant negative correlation was noticed with T min (r = -0.674*), RH-I (r = -0.134) and RH-II (r = -0.345) indicated increase in T min, RH-I and RH-II decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at harvest revealed significant positive correlation with T max(r = 0.794*), RH-I (r= 0.488), BSS (r= 0.562*) and canopy temperature (r = 0.736*) indicating increase in Tmax, RH-I, BSS and canopy temperature increased infestation of sheath rot. Further, significant negative correlation was noticed with T min (r= -0.578*), RH-II (r = -0.824**) and GDD (r = -0.874**) 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 given as follows:

Correlation at 45 DAT revealed significant positive correlation between leaf scald incidence and T max (r = 0.986**), BSS (r= 0.962**) and canopy temperature (r = 0.466) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin(r = -0.862**), RH-I (r = -0.650*), RH-II (r = -0.756*) and GDD (r = -0.723*) indicating 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 Tmax(r = 0.845**), RH-I (r= 0.415) and canopy temperature (r= 0.834**) indicated increase in T max, RH-I and canopy temperature increased infestation of scald. Significant negative correlation of scald with Tmin (r= -0.401), RH-II (r = -0.392), BSS (r= -0.664*) and GDD (r= -0.801**) showed that increase in Tmin, RH-II, BSS, and GDD decreased infestation of disease.

Correlation at 75 DAT revealed significant positive correlation between leaf scald incidence with RH-I (r = 0.852**), BSS(r= 0.520*) and canopy temperature (r = 0.752*) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with T max (r = -0.852**), Tmin (r = -0.655*), RH-II (r = -0.532*) and GDD (r = -0.774*) and indicating increase in Tmax, Tmin, RH-II and GDD decreased infestation of scald.

Correlation at 90 DAT revealed significant positive correlation between leaf scald incidence with T max (r = 0.856**), RH-I(r = 0.799*) and canopy temperature (r = 0.454) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with T min (r = -0.522*), RH-II (r = -0.459), BSS (r= -0.424) and GDD (r=-0.657*) indicated increase in Tmin, RH-II, BSS and GDD decreased infestation of scald.

Correlation analysis at harvest revealed significant positive correlation between leaf scald incidence with T max (r = 0.645*), RH-I. (r = 0.624*), BSS (r= 0.526*), and canopy temperature (r = 0.428) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.634*) and RH-II (r= -0.741*) GDD (r= -0.533*) indicated increase in T min, RH-II and GDD decreased infestation of scald.

Table 6: Correlation between weather parameters and diseases of paddy on variety Indrayani

	Sheath rot					Scald				
	INDRAYANI									
Climatic factor	**45DAT**	**60DAT**	**75DAT**	**90DAT**	**At harvest**	**45DAT**	**60DAT**	**75DAT**	**90DAT**	**At harvest**
Tmax	-0.946**	0.862**	0.818**	0.832**	0.794*	0.986**	0.845**	-0.852**	0.856**	0.645*
Tmin	-0.886**	-0.962**	-0.865**	-0.674*	-0.578*	-0.862**	-0.401	-0.655*	-0.522*	-0.634*
RH-I	0.504*	-0.418	0.426	0.134	0.488	-0.650*	0.415	0.852**	0.799**	0.624*
RH-II	-0.816**	-0.522*	-0.134	-0.345	-0.824**	-0.756*	--0.392	-0.532*	-0.459	-0.741*
BSS	0.785*	0.904**	0.454	0.636*	0.562*	0.962**	-0.664*	0.520*	-0.424	0.526*
Canopy temp.	0.962**	0.522*	0.620*	0.523*	0.736*	0.466	0.834**	0.752*	0.454	0.428
GDD	-0.851**	-0.899**	-0.760*	0.825	-0.874**	-0.723*	-0.801**	-0.774*	-0.657*	-0.533*

* significant at 5% levels
**significant at 1% levels

On variety Phule Samruddhi
a) Incidence of sheath rot
Correlation analysis of incidence of sheath rot with weather parameter with different varieties is presented in Table 7.

Correlation of incidence of sheath rot with weather parameters at 45 DAT revealed significant positive correlation with Tma (r =0.632*),RH-I (r = 0.976**), BSS (r = 0.688*), and canopy temperature(r = 0.816**) indicating increase in, Tmax, RH-I, BSS and canopy temperature increased infestation of sheath rot and significant negative correlation with Tmin (r = -0.436), GDD (r = -0.662*), RH-II (r = -0.617*) 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 = 0.718*), canopy temperature (r = 0.577*) and BSS (r =0.0.375) indicating increase in these weather element increased infestation of sheath rot. Further, significant negative correlation was noticed with RH-II (r = -0.645*), RH-I(r = -0.575*) and Tmin (r = -0.301) GDD (r= -0.790*) and indicated increase in RH-II, RH-I and Tmin decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at 75 DAT revealed significant positive correlation with, Tmax (r = 0.897**) and RH- I (r = 0.707*) BSS (r= 0.674) and canopy temperatu (r = 0.943**) indicated increase in these weather elements increased infestation of sheath rot. However, significant negative correlation was recorded with T min (r = -0.301), RH-II (r = -0.645*), and GDD (r = -0.790*) indicated increase in T min, RH-II, BSS and GDD decreased infestation of sheath rot.

Correlation of incidence of sheath rot with weather parameters at 90 DAT revealed significant positive correlation with T max (r = 0.680*), RH-I (r=0.624*), BSS (r = 0.134) and canopy temperature(r = 0.336) indicated increase in Tmax, RH-I, BSS and canopy temperature increased infestation of sheath rot. Further, significant negative correlation was noticed with Tmin (r = -0.775*), RH-II (r= -0.106) and GDD (r = -0.632*) 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 = 0.522*), 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 7.

Correlation 45 DAT revealed significant positive correlation between leaf scald incidence and T max (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 T max, 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.

Correlation at 75 DAT revealed significant positive correlation between leaf scald incidence and T max (r= 0.812**), RH-I (r= 0.365), BSS (r= 0.635*) and canopy temperature (r= 0.744*) indicated that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.478), RH-II (r = -0.456) and GDD (r = -0.342) indicated increase in Tmin, RH-II and GDD decreased infestation of scald.

Correlation at 90 DAT revealed significant positive correlation between leaf scald incidence and T max (r = 0.845**), RH-I (r= 0.556*) and canopy temperature (r = 0.662*) indicating that increase in their levels showed increase in infestation of scald. Thereafter, significant negative correlation was noticed with Tmin (r = -0.625*), RH-II (r = -0.324), BSS (r = -0.578*) and GDD (r= -0.459) indicated increase in Tmin, RH-II, BSS and GDD decreased infestation of scald.

Correlation at harvest revealed significant positive correlation between leaf scald incidence and T max (r = 0.788*), BSS(r= 0.356) 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 = -0.765*), RH-I (r = -0.345), RH-II (r = -0.586*) and GDD (r = -0.745*) indicated increase in Tmin, RH-I, RH-II and GDD decreased infestation of scald.

General view of experimental field

Table 7: Correlation between weather parameters and diseases of paddy on variety VDN-99-29 (Phule Samruddhi)

	Sheath rot					Scald				
	Phule Samruddhi									
Weather Parameters	**45DAT**	**60 DAT**	**75 DAT**	**90 DAT**	**At harvest**	**45 DAT**	**60 DAT**	**75 DAT**	**90 DAT**	**At harvest**
Tmax	0.632*	0.718*	0.897**	0.680*	0.522*	0.824**	0.924**	0.812**	0.845**	0.788*
Tmin	-0.436	-0.301	-0.301	-0.775*	-0.726*	-0.536*	-0.864**	-0.478	-0.625*	-0.765*
RH-I	0.976**	-0.575*	0.707*	0.624*	0.662*	0.756*	0.442	0.365	0.556*	-0.345
RH-II	-0.617*	-0.645*	-0.316	-0.106	-0.505*	-0.334	-0.160	-0.456	-0.324	-0.586*
BSS	0.688*	0.375	0.674*	0.134	0.457	0.522**	0.478	0.635*	-0.578*	0.356
Canopy	0.816**	0.577*	0.943**	0.336	0.140	0.735*	0.569*	0.744*	0.662*	0.236
GDD	-0.662*	-0.790*	-0.512*	-0.632*	-0.854**	0.426	-0.668*	-0.342	-0.459	-0.745*

* significant at 5% levels
** significant at 1% level

Conclusions

Disease incidence and per cent disease intensity was lower with VDN-99-29 (Phule Samruddhi) followed by VDN-3-51-18 (Indrayani). 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.

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