

Technical Report, Year: 2016-17

ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE (North West Zone)

Plant Pathology

Location: Sugarcane Research Institute, Shahjahanpur - 242 001 (UP)

Period : 2016-17

Staff position : Scientific Officer (Plant Pathology)

Financial allocation sanctioned : Yes

expenditure - Whether data with past background and correlation with past fluctuation to data obtained

Project details of North West Zone (NWZ) at Shahjahanpur

Project No.	PP 14	Identification of pathotypes/races of red rot pathogen	Conducted
Project No.	PP17 (a, b & d)	Evaluation of zonal varieties for resistance to red rot, smut and YLD	Conducted
Project No.	PP 22	Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties	Conducted
Project No.	PP 23	Assessment of elite and ISH genotypes for resistance to red rot	ISH genotypes were collected from SBI Coimbatore during the year and multiplied.
Project No.	PP 31	Screening, epidemiology and management of pokkah boeng in sugarcane	Conducted

Project No. : **PP 14**

Project title : Identification of pathotypes/races in red rot pathogen.

Objective : To gather information on the major pathotypes of red rot from the different areas/zones.

Year of start : 1983-84

Location : Shahjahanpur

Report: Four red rot isolates namely R 1102 (CoS 8436), R 1304 (CoS 07250), R 1501 (CoJ 88) and R 1502 (UP 9530) were tested for their pathogenic variability along with existing pathotypes viz; Cf 01, Cf 02, Cf 03, Cf 07, Cf 08, Cf 09 and Cf 11 on prescribed 19 host differentials. The observations of disease behaviour against red rot were recorded after 60 days of inoculation. The data were evaluated on the basis of lesion width laterally restricted, nodal transgression, white spots, rind infection, sporulation over the rind and yellowing with drying of the top. Host reactions were classified into three groups namely resistant (R), intermediate (X) and susceptible (S) reactions. Results revealed that two isolates R 1501 (CoJ 88) and R 1502 (UP 9530) exhibited reactions parallel to Cf 09 and Cf 08 pathotypes, respectively. Other two isolates R 1102 (CoS 8436) and R 1304 (CoS 07250) were found to be new emerging pathotypes on the basis of their reaction on nineteen host differentials (Table 1).

Project No.	:	PP 17 a, b & d
Project title	:	Evaluation of zonal varieties for resistance to red rot, smut and YLD
Objective	:	To gather information on the relative resistance to red rot, smut and YLD of the entries in zonal varietal trial of respective zones.
Year of start	:	1986-87 (Continuing project)
Location	:	Shahjahanpur

A. Evaluation of varieties/genotypes against red rot disease (PP 17 A)

Report: Forty two varieties were evaluated for the behavior against red rot disease in six trials. The trials conducted having four genotypes in AVT (Early I plant), 4 genotypes in AVT (Early II plant), 6 genotypes in AVT (Mid late I plant), 6 genotypes in AVT (Mid late II plant), 9 genotypes in IVT (early) and 13 genotypes in IVT (Mid late), along with susceptible check of red rot by plug and nodal cotton swab method of inoculation using two types of standard pathotypes Cf 08 and Cf 09.

Freshly sporulating inoculum was prepared from 07 days old cultures of Cf 08 and Cf 09 pathotypes individually. Conidial suspension at concentration of one million spores/ml was prepared for inoculation. The inoculation was done in 2nd week of August by plug and nodal cotton swab method. Observations were taken after 60 days of inoculation by split open the cane longitudinally. Inoculated canes free from borer infestation and other damages were taken for evaluation. The disease severity was rated based on the prescribe scale of 0-9. The disease indexing were rated as resistant (0-2), moderately resistant (2.1-4), moderately susceptible (4.1-6), susceptible (6.1-8), and highly susceptible (above 8 score). In nodal cotton swab method, the observation was recorded to remove scrap the nodes with a knife and presence or absence of lesions were noted as S and R, respectively (Table 2 & 3). The details of resistant/moderately resistant genotypes/varieties are mentioned below.

1. Varieties graded as resistant/moderately resistant by plug method against Cf 08

AVT (E, I Plant)	: Co 12027, CoLk 12203
AVT (E, II Plant)	: CoLk 11201, CoLk 11202
AVT (M, I Plant)	: Co 12029, CoH 12263, CoPant 12226 CoS 12232
AVT (M, II Plant)	: Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoLk 11214, CoS 11232
IVT (E)	: Co 13033, Co 13034, CoLk 13202, CoPant 13221, CoS 13231
IVT (M)	: Co 13035, Co 13036, CoH 13262, CoH 13263, CoLk 13204, CoPant 13223, CoPant 13224, CoPb 13182, CoS 13232

2. Varieties graded as resistant/moderately resistant by plug method against Cf 09.

AVT (E, I Plant)	: Co 12027, CoLk 12203
AVT (E, II Plant)	: CoLk 11201, CoLk 11202
AVT (M, I Plant)	: Co 12029, CoLk 12205, CoPant 12226, CoS 12232
AVT (M, II Plant)	: Co 11027, CoH 11263, CoLk 11206, CoLk 11214, CoS 11232
IVT (E)	: Co 13033, Co 13034, CoLk 13202, CoPant 13221, CoS 13231
IVT (M)	: Co 13035, Co 13036, CoH 13262, CoLk 13204, CoPant 13223, CoPant 13224, CoPb 13182, CoS 13232

3. Varieties graded as resistant by nodal cotton swab method of inoculation against Cf 08.

AVT (E, I Plant)	: Co 12026, Co 12027, CoLk 12203, CoPant 12221
AVT (E, II Plant)	: CoLk 11201, CoLk 11202, CoLk 11203
AVT (M, I Plant)	: Co 12029, CoH 12263, CoLk 12205, CoPant 12226, CoPb 12211, CoS 12232
AVT (M, II Plant)	: Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoLk 11214, CoS 11232
IVT (E)	: Co 13033, Co 13034, CoLk 13202, CoLk 13203, CoPant 13221, CoPb 13181, CoS13231
IVT (M)	: Co 13035, Co 13036, CoH 13261, CoH 13262, CoH 13263, CoLk 13204, CoPant 13223, CoPant 13224, CoPb 13182, CoS 13232, CoS 13233

4. Varieties graded as resistant by nodal cotton swab method of inoculation against Cf 09.

AVT (E, I Plant)	: Co 12026, Co 12027, CoLk 12203, CoPant 12221
AVT (E, II Plant)	: CoLk 11201, CoLk 11202, CoLk 11203
AVT (M, I Plant)	: Co 12029, CoH 12263, CoLk 12205, CoPant 12226, CoPb 12211, CoS 12232
AVT (M, II Plant)	: Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoLk 11214, CoS 11232
IVT (Early)	: Co 13033, Co 13034, CoLk 13201, CoLk 13202, CoPant 13221, CoPb 13181, CoS13231
IVT (Mid late)	: Co 13035, Co 13036, CoH 13261, CoH 13262, CoH 13263, CoLk 13204, CoPant 13223, CoPant 13224, CoPb 13182, CoS 13232, CoS 13233

B. Evaluation of genotypes/varieties against smut disease (PP 17 B)

Locations : Shahjahanpur
Year of start : 1994-1995

Reports: All the 42 genotypes/varieties of AVT (E; I P), AVT (E, II Plant), AVT (M, I Plant), AVT (M, II Plant), IVT (E) and IVT (M) were evaluated against smut disease along with smut susceptible check (Co 1158). Teliospores of *Sporisorium scitamineum* freshly collected from smut susceptible sugarcane varieties. Freshly collected whips were packed in blotting paper bags, air dried by keeping under shade. Teliospores were stored in desiccators under anhydrous calcium chloride. These collected teliospores were utilized as source of inoculum at the time of planting for primary infection. Three budded setts were dipped in spore suspension of over 90 per cent viability with a spore load of one million per ml for half an hour before planting. The incidence of the smut was recorded fortnightly intervals on the clump basis of each row on different varieties. Grading was followed on the basis of AICRP norms for disease reaction (Table 2 & 3). The list of resistant and moderately resistant genotypes/varieties is as follow.

Resistant and moderately resistant varieties against smut disease

AVT (E, I Plant) : Co 12027, CoLk 12203, CoPant 12221
AVT (E, II Plant) : CoLk 11201, CoLk 11202
AVT (M, I Plant) : Co 12029, CoH 12263, CoPant 12226, CoS 12232
AVT (M, II Plant) : CoH 11263, CoLk 11204, CoLk 11206, CoLk 11214, CoS 11232
IVT (E) : Co 13034, CoLk 13201, CoLk 13202, CoLk 13203, CoPb 13181, CoS13231
IVT (M) : Co 13035, Co 13036, CoH 13261, CoH 13262, CoH 13263, CoLk 13204, CoPant 13223, CoPant 13224, CoPb 13182, CoPb 13183, CoS 13232, CoS 13233

C. Evaluation of varieties/genotypes against yellow leaf disease (PP 17 D)

Year of start : 2015-2016
Location : Shahjahanpur

Report: The incidence of Yellow leaf disease (YLD) was recorded on forty two genotypes/varieties of AVT (E; I P), AVT (E, II Plant), AVT (M, I Plant), AVT (M, II Plant), IVT (E) and IVT (M). YLD symptoms were observed at stage of crop usually in 9th and 10th month's old. The symptoms of YLD were observed on the variety, a distinct yellowing spread laterally from the midrib into the lamina, and leaves begin to die from the tip. The leaf blade was also bleached, proceeding from the tip toward the base of the leaf. A total of twenty five canes were grouped, to evaluate the severity of YLD. Yellow leaf disease severity on different genotypes/varieties was graded on the basis of AICRP scale 0 to 5. The averages of severity grades were computed, and the scale was used to assign disease reaction of the variety. The rating of genotypes/varieties was given as resistant (R), moderately resistant (MR), moderately susceptible (MS), susceptible (S) and highly susceptible (HS). Forty two genotypes/varieties of six respective trials were evaluated to YLD. All 4 genotypes/varieties were found R in AVT (E, I plant), 2 genotypes/varieties as R and 1 as MR in AVT (E, II plant). All 6 genotypes/varieties were rated as R in AVT (M, I plant), 3 as R and 2 as MR in AVT (M, II plant). Two genotypes/varieties were found as R, 4 as MR in IVT (E) and 6 were found as R and 6 as MR in IVT (M). Details are depicted in Table 2 & 3.

Project No.	: PP 22
Project title	: Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties
Objective	: To gather information on the diseases naturally occurring in the area on varieties to compile an all India disease status report yearly.
Year of start	: 1989-90
Location	: Shahjahanpur

Report: Red rot disease was observed on variety Co 0238 with incidence of 5-15 per cent, 1-2 per cent, 2-10 per cent, 40 per cent from Nigohi, Rosa, Hargaon and Gola, respectively. The varieties CoJ 85 and CoJ 88 were affected with 10 to 20 per cent from Mankapur and Nigohi, respectively. An unknown variety was also infected with 60-90 per cent at Rosa (Shahjahanpur) area. Variety Co 1148 was also affected with 1.0 per cent stray from Ramala. Incidence of smut up to 3 per cent was noticed on varieties Co 0238, Co 1158, CoS 98231, CoS 767, CoSe 92423 and CoLk 94184 at Hardoi, Gajraula, Palia and Shahjahanpur. It was also found on CoJ 88 with more incidence at Deoband (Saharanpur). Wilt disease were reported on varieties Co 05011, Co 0238, CoS 08279, CoS 08272, CoS 08276 and CoS 08452 from SRI Shahjahanpur, its incidence varied from stray to 5 percent. This disease also observed on Co 05011 with the incidence of stray to 25 per cent from Gola Research farm, Shamli and Mawana. GSD reported in almost all the popular sugarcane cultivars and its incidence varied from 2 to 25 per cent in Shahjahanpur and Bareilly. Pokkah boeng disease reported in Co 0238 with incidence of 15-30 per cent from SRI Shahjahanpur and Hardoi. It was also reported up to incidence of 5 per cent from Shahjahanpur, Sitapur, Gajraula, Palia and Gola. The popular cultivars viz; Co 0238, Co 0118, Co 05011, CoS 08279, CoS 08272, CoS 8436, CoSe 01434 and UP 05125 were affected by yellow leaf disease (YLD) from various sugar mill area. Sugarcane mosaic, Stinking rot, Pine Apple diseases were also noticed at various places in traces while Leaf binding in traces at few places and SRI Shahjahanpur farm on varieties CoS 08272, CoS Co 0118 and Co 0238. Survey details are given in Table 4.

Project No.	: PP 31
Project title	: Screening, epidemiology and management of pokkah boeng in sugarcane
Objective	: To study the development of pokkah boeng disease in relation to weather parameters and its management in sugarcane crop.
Year of start	: 2011-12

Location : Shahjahanpur

Report: Symptoms of pokkah boeng observed on various varieties having incidence of chlorotic streaks, curling and twisting of leaves. Disease reaction was recorded according to standard norms of AICRP. A total of thirteen desirable varieties were planted for screening and its incidence was correlated with climatic conditions. Variety Co 0238 was used as susceptible check for pokkah boeng. Of thirteen, ten varieties were displayed the behaviour of resistant. Rest three varieties were rated as moderately susceptible. No symptoms of top rot and wilting of stalk have been observed in planted sett (Table 5). The meteorological observations (climatic factors) were correlated with the incidence of pokkah boeng under natural conditions. Meteorological data were obtained from related department of this institute. The incidence of pokkah boeng disease was appeared after rain fall along with high humidity when low temperature prevails in nature. The symptoms of pokkah boeng were severely affected at temperature 32.8⁰C (Maximum), 26.0⁰C (Minimum), relative humidity up to 86.0 per cent and 462 mm rain fall in the month of July, 2016 followed by August month, where suitable for the disease development and clear cut symptoms have been observed under the weather conditions (Table 6).

Table 1. Pathogenic behaviour of *C. falcatum* pathotypes/isolates on a set of differentials during 2016-17 at Shahjahanpur.

Sl. No.	Isolates	Source	Reaction on host differentials																			
			Co 419	Co 975	Co 997	Co 1148	Co 7717	Co 62399	CoC 671	CoJ 64	CoS 767	CoS 8436	B0 91	Co 86002	Co 86032	Co 7805	CoV 92102	CoSe 95422	Baragua	Khakai	SES 594	Tallied with pathotype
1	Cf 01	Co 1148	R	S	S	S	R	S	S	S	R	R	R	S	S	S	S	R	R	S	R	-
2	Cf 02	Co 7717	X	R	S	R	S	X	S	X	R	R	R	S	S	S	S	S	R	S	R	-
3	Cf 03	CoJ 64	R	R	S	R	R	R	X	S	R	R	R	X	X	S	X	X	R	S	R	-
4	Cf 07	CoJ 64	X	R	S	S	R	R	X	S	R	R	R	S	S	S	S	R	R	S	R	-
5	Cf 08	CoJ 64	X	S	S	S	S	S	S	S	X	R	R	S	S	S	S	S	R	S	R	-
6	Cf 09	CoS 767	X	X	S	S	R	R	X	S	S	R	R	S	S	S	X	S	R	S	R	-
7	Cf 11	CoJ 64	S	X	S	X	X	X	X	S	X	R	X	S	S	S	S	R	X	X	R	-
8	R 1102	CoS 8436	S	S	S	X	R	S	S	S	R	S	R	S	S	S	S	S	R	S	R	New
9	R 1304	CoS 07250	S	R	S	S	R	S	S	S	S	S	S	S	S	S	S	S	S	S	R	New
10	R 1501	CoJ 88	X	S	S	S	S	S	S	S	X	R	R	S	S	S	S	S	R	S	R	Cf 08
11	R 1502	UP 9530	X	X	S	S	R	R	X	S	S	R	R	S	S	S	X	S	R	S	R	Cf 09
R-Resistant, X- Intermediate, S- Susceptible																						

Table 2: Evaluation of Pre-zonal/ Zonal genotypes/varieties to red rot and smut during 2016-17 at Shahjahanpur.

Sl. No.	Genotypes/ varieties	Reaction against Red rot				Reaction to smut	Reaction to YLD
		Cf 08		Cf 09			
		Plug method	Nodal Cotton swab	Plug method	Nodal Cotton swab		
AVT (E-I Plant)							
1	Co 12026	MS	R	S	R	MS	R
2	Co 12027	MR	R	MR	R	MR	R
3	CoLk 12203	MR	R	MR	R	R	R
4	CoPant 12221	MS	R	MS	R	MR	R
5	CoJ 64	HS	S	HS	R	MR	R
6	Co 0238	MS	R	MS	R	MS	R
AVT(E-II Plant)							
1	CoH 11262	HS	S	HS	S	MS	MS
2	CoLk 11201	MR	R	MR	R	MR	R
3	CoLk 11202	MR	R	MR	R	MR	R
4	CoLk 11203	MS	R	MS	R	MS	MR
5	Co 0238	MS	R	S	R	R	MR
6	CoJ 64	HS	S	HS	S	R	R
AVT (M-I Plant)							
1	Co 12029	MR	R	MR	R	R	R
2	CoH 12263	MR	R	MS	R	R	R
3	CoLk 12205	MS	R	MR	R	MS	R
4	CoPant 12226	MR	R	MR	R	MR	R
5	CoPb 12211	S	R	MS	R	MS	R
6	CoS 12232	MR	R	MR	R	R	R
7	CoS 767	MS	R	HS	S	R	R
8	CoS 8436	MS	R	MS	R	MR	R
9	CoPant 97222	S	S	S	S	R	R
AVT(M-II Plant)							
1	Co 11027	MR	R	MR	R	MS	MR
2	CoH 11263	MR	R	MR	R	MR	R
3	CoLk 11204	MR	R	MS	R	MR	R
4	CoLk 11206	MR	R	MR	R	MR	MS
5	CoLk 11214	MR	R	MR	R	MR	MR
6	CoS 11232	MR	R	MR	R	R	R
7	CoS 767	MS	R	HS	S	R	R
8	CoS 8436	MS	R	MR	R	R	MR
9	CoPant 97222	S	S	S	S	R	R
	Co 453 (S)	S	S	S	S	-	-
	Co 1158 (S)	-	-	-	-	HS	-

Table 3: Evaluation of Pre-zonal/ Zonal genotypes/varieties to red rot and smut during 2016-17 at Shahjahanpur.

IVT Early							
Sl. No.	Varieties	CF 08		CF09		Reaction to smut	Reaction to YLD
		Plug	Nodal Cotton swab	Plug	Nodal Cotton swab		
1	Co 13033	MR	R	MR	R	MS	MS
2	Co 13034	MR	R	MR	R	MR	MS
3	CoLk 13201	S	S	MS	R	MR	MR
4	CoLK 13202	MR	R	MR	R	MR	MR
5	CoLk 13203	MS	R	S	S	R	MS
6	CoPant 13221	MR	R	MR	R	MS	MR
7	CoPant 13222	S	S	S	S	MS	R
8	CoPb 13181	MS	R	MS	R	R	MR
9	CoS13231	MR	R	MR	R	R	R
10	Co 0238	MS	R	MS	R	R	-
11	CoJ 64	S	S	S	S	MR	R
	Co 453 (S)	S	S	S	S	-	-
	Co 1158 (S)	-	-	-	-	HS	-
IVT Mid late							
1	Co 13035	MR	R	MR	R	R	R
2	Co 13036	MR	R	MR	R	R	MR
3	CoH 13261	MS	R	MS	R	R	MS
4	CoH 13262	MR	R	MR	R	R	MR
5	CoH 13263	MR	R	MS	R	MR	R
6	CoLk 13204	MR	R	MR	R	MR	R
7	CoLk 13205	HS	S	S	S	MS	R
8	CoPant 13223	MR	R	MR	R	R	R
9	CoPant 13224	MR	R	MR	R	R	R
10	CoPb 13182	MR	R	MR	R	R	MR
11	CoPb 13183	S	S	S	S	MR	MR
12	CoS 13232	MR	R	MR	R	MR	MR
13	CoS 13233	MS	R	MS	R	R	MR
14	CoPant 97222	HS	S	MS	R	R	R
15	CoS 767	MR	R	MS	R	MS	R
16	CoS 8436	MS	R	MS	R	R	R
17	Co 453 (S)	S	S	S	S	-	-
18	Co 1158 (S)	-	-	-	-	HS	-

Table 4. Survey of naturally occurring sugarcane diseases during 2016-17 at Shahjahanpur.

Sl. No.	Diseases	Name of area surveyed	Per cent disease incidence (Clump basis)	Varieties affected	Crop stage
1	Red rot	Gonda	10	CoJ 85	9 Months
		Nigohi (Shahjahanpur)	15-20	CoJ 88	8 Months
		Gajraula	Traces	Co 1158	8 Months
		Nigohi (Shahjahanpur)	5-15	Co 0238	7 Months
		Harganv (Khiri)	2-10	Co 0238	8 Months
		Shahjahanpur, Bareilly	1-2	Co 0238	7 Months
		Gola (Lakhimpur Khiri)	40	Co 0238	9 Months
		Rosa (Shahjahanpur)	60-90	Unknown varieties	10 Month
		Ramala	1	Co 1148	10 Month
2	Smut	Palia (Lakhimpur Khiri)	Traces-3	CoS 97264, CoS 98231, CoSe 92423	8 Months
		Rosa (Shahjahanpur)	Traces-1	CoJ 64, CoLk 94184	7 Months
		Hardoi	Traces-1	Co 0238, CoS 767	8 Months
		Gajraula	Traces	Co 1158	8 Months
3	Wilt	Shahjahanpur	Traces-5	Co 05011, CoS 08279, Co 08272, CoS 08276, CoS 08452, Co 0238	9 Months
		Gola (Lakhimpur Khiri), Shamli, Mawana	25	Co 05011	10 Month
		Gola (Lakhimpur Khiri)	Traces-5	CoS 08452, CoS 08276	10 Month
		Bareilly	5-7	Co 0238	10 Month
		Gonda	5	CoJ 85	9 Months
4	Grassy shoot disease	Bareilly	1-5	CoJ 88, CoS 8436, CoS 8432, CoLk 94184	Ratoon
		Bareilly	10	Co 0238	4 Months
		Hargaon (Khiri), Shahjahanpur, Gajraula	1-3	Co 0238	Ratoon
		Shahjahanpur	1-25	Co 0238, CoS 97264	Ratoon
		Hardoi	Traces-5	Co 0238, Co 0118, Co 05011, CoS 767, CoS 8436	5 Months
		Bareilly, Palia (Khiri)	3-5	CoJ 88	4 Months
		Lakhimpur Khiri	Traces-2	CoS 97261, CoS 97264, CoS 08279, Co 08276, CoS 08452, CoS 982321, CoSe 92423, UP 05125, Co 0238, Co 0118	4 Months

Table 4 Contd.

Sl. No.	Diseases	Name of area surveyed	Per cent disease incidence (Clump basis)	Varieties affected	Crop stage
5	Yellow leaf disease	Shahjahanpur	Traces	Co 05011, CoS 08279, CoS 08272, CoSe 01434, Co 0118, Co 0238, UP 05125	10 Month
		Shahjahanpur	5-10	CoS 767, Co 0238, CoS 8436, CoLk 11201, CoLk 11202, CoLk 11203, CoH 11262, Co 11027, CoLk 11206, CoPb 13181, CoH 13261, CoS 13233	10 Month
6	Pokkah boeng	Shahjahanpur	1-30	Co 0238, Co 118, CoS 08272, Co 05011, CoS 08452, CoS 08279, CoS 08276	8 Months
		Shahjahanpur, Sitapur, Gajraula	2-8	Co 0238	9 Months
		Palia (Lakhimpur Khiri)	Traces	CoSe 01434	8 Months
		Hardoi	1-15	Co 0118, Co 0238	8 Months
		Gola (Lakhimpur Khiri)	Traces	CoS 8436, CoS 97261, CoS 08279, CoS 08276, Co 0238, Co 98014	10 Months
7	Rust	Khaikhera, Mawana	1	CoS 767	10 Months
8	Mosaic	Shahjahanpur	2-5	UP 05125	10 Months
9	Leaf binding	Shahjahanpur, Gola (Lakhimpur Khiri)	Traces	CoS 08272, CoS 08276, Co 98014, CoS 8452, Co 0238	3 Months
		Bareilly, Shahjahanpur	Traces-7	Co 0118, Co 0238, CoJ 88	3 Months
10	Stinking rot	Shahjahanpur, Gola (Lakhimpur Khiri)	Traces	CoS 08279, Co 0238, CoS 08279, CoS 08272, Co 08011, CoS 8276	6 Months
11	Pine apple	Bareilly	Traces	CoLk 94184	4 Months

Table 5. Behaviour of various varieties against pokkah boeng disease under natural condition during 2016-2017 at Shahjahanpur.

Sl. No.	Varieties	Percent infected plants				Disease reaction
		Mild	Moderate	Severe	Incidence	
01	CoS 11244	3	3	0	6	MS
02	CoS 14233	1	0	0	1	R
03	CoSe 11456	4	0	0	4	R
04	CoSe 13453	2	0	0	2	R
05	CoS 14231	4	0	0	4	R
06	CoSe 12451	6	1	0	7	MS
07	CoSe 13452	1	0	0	1	R
08	CoS 12231	3	0	0	3	R
09	CoSe 13451	6	0	0	6	MS
10	CoLk 09202	0	0	0	0	R
11	CoSe 09455	2	0	0	2	R
12	CoSe 12453	1	0	0	1	R
13	CoPant 97222	0	0	0	0	R
14	Co 0238	11	2	0	15	S

Table 6. Climatic conditions of Sugarcane Research Institute, Shahjahanpur from April, 2016 to March, 2017.

Sl. No.	Month	Rain fall (mm)	Temperature °C		Relative humidity % (Mean)
			Maximum	Minimum	
01	April, 2016	-	38.9	22.5	24.0
02	May, 2016	36.6	38.2	24.4	54.0
03	June, 2016	50.2	37.0	27.5	67.0
04	July, 2016	462.0	32.8	26.0	86.0
05	August, 2016	168.4	33.7	26.1	80.0
06	September, 2016	158.4	33.7	25.0	77.0
07	October, 2016	28.4	33.1	19.7	67.0
08	November, 2016	-	28.3	12.0	68.0
09	December, 2016	-	21.4	9.8	84.0
10	January, 2017	16.0	20.9	8.4	79.0
11	February, 2017	1.8	25.9	10.6	65.0
12	March, 2017	13.6	30.1	14.7	53.0