ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE

Technical Report

Year: 2015-16

Plant Pathology

Sugarcane Research Institute, Shahjahanpur - 242 001 (UP)

Period	**:**	**2015-16**
Staff position	**:**	Senior Scientific Assistant (Plant Pathology)
Financial allocation sanctioned expenditure - Whether data with past background and correlation with past fluctuation to data obtained	**:**	Yes

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: Five red rot isolates viz; R 1102 (CoS 8436), R 1201 (CoSe 95422), R 1302 (CoLk 8102), R 1303 (CoSe 98231) and R 1304 (CoS 07250) were tested for their pathogenic variability along with designated pathotypes viz; Cf 07, Cf 08, Cf 09 and Cf 11 on prescribed sugarcane host differentials during the year. The observations of disease behaviour were recorded after 60 days of inoculation. The evaluations were done on the basis of symptomatology such as lesion width laterally restricted, nodal transgression, white spots, rind infection, sporulation over the rind, yellowing and drying of the top. Host reactions were categorized into three groups i.e. resistant (R), susceptible (S) and intermediate (X) reactions. Three isolates such as R 1201 (CoSe 95422), R 1302 (CoLk 8102) and R 1303 (CoSe 98231) exhibited reactions similar to Cf 08 pathotypes. Rest two new isolates R 1102 and R 1304 displayed variable pathogenic reactions on host differentials, different from the existing pathotypes, were isolated from CoS 8436 and CoS 07250, respectively. On the basis of pathogenic behaviour of above two isolates, it is clear that there are emergence of two new pathotypes i.e. R 1102 (CoS 8436) and R 1304 (CoS 07250) along with the existence of Cf 08 and Cf 09 pathotypes in Uttar Pradesh (Table 1).

Project No.	**:**	**PP 17**
Project title	**:**	Evaluation of pre-zonal/zonal varieties/genotypes for resistance to red rot, smut and YLD
Objective	**:**	To gather information on the relative resistance of the varieties to red rot and smut in pre-zonal/zonal trials 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: Six trials were carried out under this project for evaluating red rot disease behaviour. Four varieties of AVT Early (I Plant), 6 varieties of AVT Early (II Plant), 5 varieties of AVT Mid late (I Plant), 8 varieties of AVT Mid late (II Plant), 12 varieties including 2 standard of IVT Early and 17 varieties of IVT Mid late including 2 susceptible checks were evaluated against red rot by plug and nodal cotton swab method by using pathotypes Cf 08 and Cf 09 in each method of inoculation. 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. The observations were recorded after 60 days of inoculation. The varieties were evaluated on the basis of 0 to 9 scale and rated as resistant (R), moderately resistant (MR), moderately susceptible (MS), susceptible (S) and highly susceptible (HS) (Table 2 & 3). The details of resistant/moderately resistant varieties/genotypes are given below.

1. Varieties graded as resistant/moderately resistant by plug method of inoculation with Cf 08

AVT Early (I Plant)	:	CoLk 11202
AVT Early (II Plant)	:	CoS 10231
AVT Mid late (I Plant)	:	Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoS 11232
AVT Mid late (II Plant)	:	CoH 10262, CoPant 10221, CoPb 10181
IVT Early	:	CoLk 12203, CoPant 12221, CoS 12231
IVT Mid late	:	CoPant 12223, CoPant 12225, CoS 12232

2. Varieties graded as resistant/moderately resistant by plug method of inoculation with Cf 09

AVT Early (I Plant)	:	CoLk 11202
AVT Early (II Plant)	:	CoS 10231
AVT Mid late (I Plant)	:	Co 11027, CoH 11263, CoLk 11206, CoS 11232
AVT Mid late (II Plant)	:	CoH 10262, CoPant 10221, CoPb 10181
IVT Early	:	CoLk 12203, CoPant 12221, CoS 12231
IVT Mid late	:	Co 12028, CoPant 12223, CoPant 12224, CoPant 12226, CoS 12232

3. Varieties graded as resistant/moderately resistant by nodal cotton swab method of inoculation with Cf 08

AVT Early (I Plant)	:	CoLk 11201, CoLk 11202, CoLk 11203
AVT Early (II Plant)	:	Co 10035, CoS 10231, CoH 10261
AVT Mid late (I Plant)	:	Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoS 11232
AVT Mid late (II Plant)	:	Co 10036, CoH 10262, CoPant 10221, CoPb 10181
IVT Early	:	CoLk 12203, CoLk 12204, CoPant 12221, CoPant 12222, CoS 12231
IVT Mid late	:	Co 12028, CoLk 12205, CoPant 12223, CoPant 12223, CoPant 12224, CoPant 12225, CoPant 12226, CoPb 12212, CoS 12232

4. Varieties graded as resistant/moderately resistant by nodal cotton swab method of inoculation with Cf 09

AVT Early (I Plant)	:	CoLk 11201, CoLk 11202, CoLk 11203
AVT Early (II Plant)	:	Co 10035, CoS 10231, CoH 10261
AVT Mid late (I Plant)	:	Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoS 11232
AVT Mid late (II Plant)	:	Co 10036, CoH 10262, CoPant 10221, CoPb 10181
IVT Early	:	CoLk 12203, CoLk 12204, CoPant 12221, CoPant 12222, CoS 12231
IVT Mid late	:	Co 12028, CoH 12263, CoLk 12205, CoPant 12223, CoPant 12224, CoPant 12225, CoPant 12226, CoPb 12211, CoPb 12212, CoS 12232

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

Year of start : 1994-1995

Location **:** Shahjahanpur

Reports: All the entries of AVT Early (I & II Plant), AVT Mid late (I & II Plant), IVT Early and IVT Mid late were evaluated against smut disease along with smut susceptible check (Co 1158). Teliospores of *Sporisorium scitamineum* were freshly collected from smut susceptible sugarcane varieties, and utilized as source of inoculum. Freshly collected whips were packed in blotting paper bags, air dried by keeping under shade. The teliospores were stored in desiccators under anhydrous calcium chloride. 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 on the clump basis in each row on different varieties (Table 2 & 3).

Resistant/moderately resistant varieties against smut disease

AVT Early (I Plant)	:	CoLk 11201, CoLk 11202, CoLk 11203, CoH 11262
AVT Early (II Plant)	:	Co 10035, CoS 10231, CoH 10261
AVT Mid late (I Plant)	:	Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoS 11232
AVT Mid late (II Plant)	:	Co 10036, CoH 10262, CoPant 10221, CoPb 10181, CoPb 10182
IVT Early	:	Co 12026, Co 12027, CoH 12261, CoLk 12201, CoLk 12202, CoLk 12203, CoLk 12204, CoPant 12221, CoPant 12222, CoS 12231
IVT Mid late	:	Co 12028, Co 12029, CoH 12262, CoH 12263, CoLk 12205, CoLk 12206, CoPant 12223, CoPant 12224, CoPant 12225, CoPant 12226, CoPb 12181, CoPb 12182, CoPb 12211, CoPb 12212, CoS 12232

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

Year of start : 2015-2016

Location **:** Shahjahanpur

Report: Yellow leaf disease (YLD) was assessed on varieties/genotypes of AVT Early (I & II Plant) and AVT Mid late (I & II Plant), which were planted in breeding division. YLD symptoms were recorded during the maturing stage of crop usually in 10^{th} and 12^{th} month's crop stage. 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 become 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 varieties/genotypes were graded according to prescribe scale 0 to 5. The average of severity grades was computed, and the scale was used to assign disease reaction of the variety. The varieties were rated as resistant (R), moderately resistant (MR), moderately susceptible (MS), susceptible (S) and highly susceptible (HS) on the basis of their scale. A total of twenty three varieties/genotypes were screened out for yellow leaf disease. Out of these, nineteen varieties/genotypes were found R/MR and rest were MS/S to YLD (Table 4).

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 was reported with two percent incidence on variety Co 1148 at Muzaffarnagar, CoJ 88 at Hardoi and 30 percent on UP 9530 from Balrampur. The incidence of smut up to 2 percent was noticed on varieties Co 05011, UP 05125 and UP 9530 at Shahjahanpur and 0.1 to 2 percent on several varieties at various part of western Uttar Pradesh (UP). Maximum incidence up to 5 - 25 percent of wilt was observed on variety Co 0238 at Bareilly and 2 to 15 percent were reported on Co 05011 from Shahjahanpur, Hardoi and Faizabad. Fifteen percent incidence was also observed on Co 0238 and Co 118 at Faizabad and Shahjahanpur, respectively. GSD was reported in almost all the popular sugarcane cultivars and its incidence varied from 1 to 5 percent from central and western part of UP. Yellow leaf disease (YLD) was reported up to 1 – 30 percent on several popular cultivars from SRI Shahjahanpur and 10 – 20 percent observed at Sultanpur, Faizabad and Balrampur districts. The maximum incidence of 20 – 25 percent of pokkah boeng disease was reported from Nazibabad and Khatauli on most of popular cultivars. The meager incidence (1 - 4%) of pokkah boeng was reported from Shahjahanpur, Gajipur and various locations of western UP on several cultivars. The incidence of rust disease was occurred on variety CoS 767 with 2 percent at western region of UP. Sugarcane mosaic disease was occurred with 10 to 20 percent on CoPant 97222 at SRI, Shahjahanpur. The minor incidence of stinking rot and leaf binding were also observed at Shahjahanpur and Faizabad. The detail of survey reports are depicted in Table 5.

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 weather parameters and its management in sugarcane crop.
Year of start	**:**	2011-12
Location	**:**	Shahjahanpur

Report: Symptoms observed on infected varieties having incidence of chlorotic streaks, curling and twisting on leaves at various intensities. Data were recorded according to standard norms of AICRP. A total of 23 varieties were screened out for pokkah boeng disease. Out of these, 17 varieties were showed the behaviour as resistant. Rest varieties were graded as moderately susceptible and susceptible. No symptoms of top rot and wilting of stalk have been observed in planted sett (Table 6). The incidence of pokkah boeng was to be correlate of climatic factors (Meteorological) in relation to pathogenesis under natural conditions. Meteorological data were obtained from related department of this institute. The incidence of pokkah boeng disease was highly appeared after rain fall along with high humidity and low temperature conditions. The severe intensity of pokkah boeng symptoms was monitored at temperature 33.2 (Maximum), 26.1 (Minimum), relative humidity 85.0% and 259.70 mm rainfall in the month of August, 2015 (Table 7).

Table 1. Pathogenic behaviour of *C. falcatum* pathotypes/isolates on a set of differentials during 2015-16 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	Baragua	Khakai	SES 594	Tallied with pathotype
1	Cf 01	Co 1148	R	S	S	S	R	S	S	S	R	R	R	R	S	R	-
2	Cf 02	Co 7717	X	R	S	R	S	X	S	X	R	R	R	R	S	R	-
3	Cf 03	CoJ 64	R	R	S	R	R	R	X	S	R	R	R	R	S	R	-
4	Cf 07	CoJ 64	X	R	S	S	R	R	X	S	R	R	R	R	S	R	-
5	Cf 08	CoJ 64	X	S	S	S	S	S	S	S	X	R	R	R	S	R	-
6	Cf 09	CoS 767	X	X	S	S	R	R	X	S	S	R	R	R	S	R	-
7	Cf 11	CoJ 64	S	X	S	X	X	X	X	S	X	R	X	X	X	R	-
8	**R 1102**	**CoS 8436**	**S**	**S**	**S**	**X**	**R**	**S**	**S**	**S**	**R**	**S**	**R**	**R**	**S**	**R**	**New**
9	R 1201	CoSe 95422	X	S	S	S	S	S	S	S	X	R	R	R	S	R	Cf 08
10	R 1302	CoLK 8102	X	S	S	S	S	S	S	S	X	R	R	R	S	R	Cf 08
11	R 1303	CoSe 98231	X	S	S	S	S	S	S	S	X	R	R	R	S	R	Cf 08
12	**R 1304**	**CoS 07250**	**S**	**R**	**S**	**S**	**R**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**R**	**New**
R-Resistant, X- Intermediate, S- Susceptible																	

Note: Three pathotypes namely Cf 01, Cf 02 and Cf 03 were deteriorated at our institute, therefore the inoculation with these pathotypes could not be done during this year. The reactions of these pathotypes on host differential were taken from previous year, which were utilized to compare the reaction of new isolates.

Table 2. Evaluation of pre-zonal/zonal genotypes/varieties against red rot and smut during 2015-16 at Shahjahanpur.

Sl. No.	Genotypes/ Varieties	Reaction against Red rot				Reaction to smut
		Plug method		Nodal Cotton swab		
		Cf 08	Cf 09	Cf 08	Cf 09	
AVT Early (I Plant)						
1	CoLk 11201	MS	MS	MR	MR	R
2	CoLk 11202	MR	MR	R	R	R
3	CoLk 11203	MS	MS	MR	R	MR
4	CoH 11262	HS	HS	S	S	R
5	Co 1158	-	-	-	-	HS
AVT Early (II Plant)						
1	Co 10035	MS	MS	MR	MR	MR
2	CoS 10231	MR	MR	R	R	R
3	CoH 10261	MS	MS	MR	MR	R
4	Co 0238	MS	S	MR	MS	R
5	CoJ 64	HS	HS	S	S	R
6	CoPant 84211	MS	S	R	MS	R
7	Co 1158	-	-	-	-	HS
AVT Mid late (I Plant)						
1	Co 11027	MR	MR	R	R	R
2	CoH 11263	MR	MR	R	R	R
3	CoLk 11204	MR	MS	R	MR	R
4	CoLk 11206	MR	MR	R	R	R
5	CoS 11232	MR	MR	R	R	R
6	Co 1158	-	-	-	-	S
AVT Mid late (II Plant)						
1	Co 10036	MS	MS	MR	MR	R
2	CoH 10262	MR	MR	R	R	R
3	CoPant 10221	MR	MR	R	R	MR
4	CoPb 10181	MR	MR	R	R	R
5	CoPb 10182	HS	HS	S	S	R
6	CoS 767	MS	S	MR	MR	R
7	CoS 8436	MS	MS	MR	MR	R
8	CoPant 97222	S	S	MS	MS	R
	Co 1158	-	-	-	-	S

Table 3. Evaluation of pre-zonal/zonal genotypes/varieties against red rot and smut during 2015-16 at Shahjahanpur

Sl. No.	Genotypes/ Varieties	Reaction against Red rot				Reaction to smut
		Plug method		Nodal Cotton swab		
		Cf 08	Cf 09	Cf 08	Cf 09	
IVT Early						
1	Co 12026	S	HS	MS	S	R
2	Co 12027	HS	HS	S	S	R
3	CoH 12261	HS	HS	S	S	R
4	CoLk 12201	HS	HS	S	S	R
5	CoLk 12202	S	S	MS	MS	R
6	CoLk 12203	MR	MR	R	R	R
7	CoLk 12204	MS	MS	MR	MR	R
8	CoPant 12221	MR	MR	R	R	R
9	CoPant 12222	MS	MS	MR	MR	R
10	CoS 12231	MR	MR	R	R	R
11	CoJ 64	HS	HS	S	S	R
12	Co 0238	MS	S	MR	MS	R
13	Co 1158	-	-	-	-	HS
IVT Mid late						
1	Co 12028	MS	MR	MR	R	R
2	Co 12029	HS	HS	S	S	R
3	CoH 12262	S	S	MS	MS	R
4	CoH 12263	S	MS	MS	MR	R
5	CoLk 12205	MS	MS	MR	MR	R
6	CoLk 12206	S	S	MS	MS	R
7	CoPant 12223	MR	MR	R	R	R
8	CoPant 12224	MS	MR	MR	R	R
9	CoPant 12225	MR	MS	R	MR	R
10	CoPant 12226	MS	MR	MR	R	R
11	CoPb 12181	S	S	MS	MS	R
12	CoPb 12182	HS	HS	S	S	R
13	CoPb 12211	S	MS	MS	MR	R
14	CoPb 12212	MS	MS	MR	MR	R
15	CoS 12232	MR	MR	R	R	R
16	CoS 767	MS	HS	MR	S	R
17	CoPant 97222	S	MS	MS	S	R
18	Co 1158	-	-	-	-	S

Table 4. Behaviour of YLD on various sugarcane varieties in AICRP experiment.

Sl. No.	Variety/Genotype	Disease reaction	Sl. No.	Variety/Genotype	Disease reaction
AVT Early (I Plant)			3	CoLk 11204	R
1	CoLk 11201	R	4	CoLk 11206	S
2	CoLk 11202	MR	5	CoS 11232	R
3	CoLk 11203	R	**AVT Mid late (II Plant)**		
4	CoH 11262	MR	1	Co 10036	R
AVT Early (II Plant)			2	CoH 10262	MS
1	Co 10035	S	3	CoPant 10221	R
2	CoS 10231	MR	4	CoPb 10181	R
3	CoH 10261	R	5	CoPb 10182	MR
4	Co 0238	R	6	CoS 767	MR
5	CoJ 64	R	7	CoS 8436	MR
6	CoPant 84211	MR	8	CoPant 97222	R
AVT Mid late (I Plant)			-	-	-
1	Co 11027	MR	-	-	-
2	CoH 11263	MS	-	-	-

Table 5. Survey of naturally occurring sugarcane diseases during 2015-16.

Sl. No.	Diseases	Name of area surveyed	% Disease incidence	Varieties affected	Crop stage
1	Red rot	Balrampur	15-30	UP 9530	10 Months
		Hardoi	2	CoJ 88	10 Months
		Mansurpur, Titawi, Shamli	0.1 – 2	Co 1148	10 Months
2	Smut	Shahjahanpur	1-2	Co 05011, UP 05125, UP 9530	10 Months
		Shamli	0.1	CoS 07250, CoSe 01434	8 Months
		Shabitgarh	2	CoSe 98231	9 Months
		Daurala/Aguata	0.1	CoSe 03234	9 Months
		Deoband	0.1	CoS 07250	9 Months
3	Wilt	Shahjahanpur, Hardoi, Faizabad	2-15	Co 05011	10 Months
		Hardoi	2-4	CoJ 88	9 Months
		Balrampur, Faizabad	0.1	CoSe 01434	10 Months
		Faizabad	15	Co 0238	10 Months
		Bareilly	5-25	Co 0238	8 Months
		Shahjahanpur	0.1	CoS 08279, UP 05125	10 Months
		Lakhipur Khiri	0.1	Co 98014	8 Months
		Shahjahanpur	15	Co 0118	10 Months
		Shahjahanpur	5	CoS 08272	8 Months
		Deoband, Khatauli, Mawana, Shamli, Daurala, Ramala	0.1	CoS 07250, Co 05011, CoSe 03251	8 Months

Table 5. Continued...

4	Grassy shoot disease	Gajipur, Sultanpur, Balrampur, Shahjahanpur	2-5	CoS 767, CoSe 05460, CoS 13231, CoS 08272, Co 0118, Co 05011, Co 0238	9 Months
		Shahjahanpur	0.1	UP 05125	10 Months
		Khatauli	1-5	CoS 08279, CoS 8436, Co 0238, Co 98014, CoS 767	10 Months
		Shamli	1-2	CoSe 03234,CoS 767,Co 98014, CoSe 01434,CoS 07250,CoS 03251, CoS 08279	10 Months
		Deoband	0.1	CoS 07250	8 Months
		Rohana Kalan	2	CoSe 01434, CoS 8436, CoS 07250	9 Months
		Tikola	0.1	Co 0238, Co 0118	8 Months
		Morana	1-2	UP 0097	8 Months
		Khaikheri	1-2	CoS 8436	8 Months
5	Yellow leaf disease	SRI Farm, Shahjahanpur	1-30	Co 05011, CoS 08279, CoS 08272, CoSe 01434, Co 0118, Co 0238, UP 05125, CoS 8436, CoS 767	10 Months
		Sultanpur, Roja Gaon, Balrampur	10-20	CoSe 01434, CoS 08272, Co 0118, Co 0238, CoS 08279	11 Months
6	Pokkah boeng	SRI Farm, Shahjahanpur	1-2	CoS 08279, CoS 08272, UP 05125, CoSe 01434, Co 0238, Co 98014, CoS 8436	9 Months
		Gajipur	1-4	CoS 10239, CoS 07240, CoS 06279, UP 05125, Co 0238, CoS 91269, CoS 09246, CoSe 96436	9 Months
		Balrampur	5-10	CoSe 01434	10 Months
		Nzibabad, Khatauli	20-25	Co 0238, Co 0118, Co 98014, CoSe 03234, CoS 8436, CoSe 01434, CoS 08279, CoS 03251	10 Months
		Rohana Kalan, Deoband, Thana Bhawan, Titawi	2	CoS 8436,Co 0238, CoS 03251, U.P. 05125, Co 9814, CoSe 03234, U.P. 0097, Co 05011	10 Months
		Laksar, Morna, Shamli	2	CoSe 03234,Co 0238, Co 0118, Co 09814, CoSe 01434, CoS 8436, CoS 03251, CoS 08272, CoJ 64	9 Months
7	Rust	Khatauli, Laksar, Mawana	2	CoS 767	8 Months
8	Mosaic	Sadat	0.1	CoS 08272, CoSe 05460,	10 Months
		Shahjahanpur	10-20	CoPant 97222	10 Months
9	Leaf binding	SRI farm, Shahjahanpur	0.1	CoPb 10181, Co 05011	10 Months
10	Stinking rot	Faizabad	0.1	CoS 08279	10 Months

Table 6. Behaviour of various varieties against pokkah boeng disease under natural condition at Shahjahanpur.

Sl. No.	Varieties	Percent infected plants				Disease reaction
		Mild	Moderate	Severe	Incidence	
01	CoS 10239	6	1	0	7	MS
02	CoS 11277	2	0	0	2	R
03	CoS 11244	2	0	0	2	R
04	CoS 06279	1	0	0	1	R
05	CoS 09232	3	0	0	3	R
06	CoS 8436	8	3	0	11	S
07	CoS 13231	1	0	0	1	R
08	CoSe 12452	0	0	0	0	R
09	CoSe 12453	3	0	0	3	R
10	CoSe 11455	0	0	0	0	R
11	CoSe 12451	0	0	0	0	R
12	CoSe 11456	2	0	0	2	R
13	CoSe 09455	3	0	0	3	R
14	CoSe 13453	2	0	0	2	R
15	CoSe 13451	5	1	0	6	MS
16	CoSe 11451	0	0	0	0	R
17	CoSe 13452	6	0	0	6	MS
18	CoSe 06460	0	0	0	0	R
19	CoSe 01334	5	1	0	6	MS
20	CoLk 09204	3	0	0	3	R
21	CoLk 11201	2	1	0	3	R
22	CoLk 13201	2	0	0	2	R
23	Co 0238	10	5	0	15	S

Table 7. Climatic conditions of Sugarcane Research Institute, Shahjahanpur during April, 2015 to March, 2016.

Sl. No.	Month	Rain fall (mm)	Temperature ^{0}C		Relative humidity % (Mean)
			Maximum	Minimum	
01	April, 2015	13.0	34.1	19.7	59.0
02	May, 2015	14.2	40.5	24.3	50.0
03	June, 2015	54.0	38.5	27.0	55.0
04	July, 2015	308.0	33.8	26.6	78.0
05	August, 2015	259.7	33.2	26.1	85.0
06	September, 2015	13.4	34.5	24.9	72.0
07	October, 2015	10.4	32.4	19.6	68.0
08	November, 2015	-	28.8	14.2	70.0
09	December, 2015	-	22.8	8.9	73.0
10	January, 2016	1.6	21.2	7.6	77.0
11	February, 2016	6.4	25.9	11.7	67.0
12	March, 2016	4.4	31.7	16.6	57.0