

ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE
2014-15
Technical Report
Plant Pathology, Shahjahanpur

Periods	:	2014-15
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

Six red rot isolates viz., R 1102(CoS 8436), R 1201(CoSe95422), R 1301(CoSe 92423), R 1302 (CoLk8102), R1303 (CoSe98231) and R1304 (CoS07250) were tested for their pathogenic variability along with designated pathotypes viz; Cf 01, Cf 07, Cf 08, Cf 09 and Cf 11 on prescribed fourteen sugarcane host differentials during the year under report. The observations on disease development were recorded after 60 days of inoculation. The evaluations were done on the basis of symptomatology viz., lesion width laterally restricted, nodal transgression, white spots, and rind infection, sporulation over the rind and yellowing / drying of the tops. Host reactions were categorized into three groups i.e. Resistant (R), Susceptible (S) and Intermediate (X) reactions (Table-1).

On the basis of their reactions on differential, isolate R 1201(CoSe 95422) R 1302(CoLk 8102) and R 1303(CoSe 98231) were found similar to existing pathotype Cf08. Isolate R 1301(CoSe 92423) was found similar to existing pathotype cf 09. Remaining two isolates i.e; R1102 (CoS 8436 from Gola-Kheri) and R 1304 (CoS07250 from Gularia) were distinct in reaction on differential from existing pathotypes. It is clear that there is emergence of two new pathotypes obtained on variety CoS 8436 and CoS 07250 in Uttar Pradesh.

Project No. : PP17

Project title : Evaluation of pre-zonal/ zonal varieties/ genotypes for resistance to red rot and smut.
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
Location : Shahjahanpur

Report

A- Red rot

Under this project 13 genotypes of IVT (M), 07 varieties of IVT (E), 06 varieties of AVT (E-I P), 07 varieties of AVT (E-II P), 08 varieties of AVT (M-I P) and 05 varieties of AVT (M-II P) along with susceptible check were evaluated against red rot by plug and nodal cotton swab method using two types of inoculum i.e. Cf 08 and Cf 09 in each method of inoculation. The inoculum was prepared from seven 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 and observations were recorded after 60 days of inoculations. The varieties were evaluated on the basis of 0-9 scale and rated as Resistant (R), Moderately resistant (MR), Moderately susceptible (MS), Susceptible (S) and highly susceptible (HS) in Table-2.

(a) Varieties graded as resistant/ moderately resistant by plug method of inoculation with Cf 08

AVT (E-I P): CoS 10231

AVT (E-II P): CoH09262, CoH 09263, CoLK 09202, CoPb 09181, CoS 09246.

AVT (M-I P): CoPant 10262, CoPant 10221, CoPb 10181

AVT (M-II P): Co09022, CoH 09264, CoLK 09204, CoPb 09714, CoS 09232.

IVT (Early): CoLK11202, CoPb11212

IVT (Mid-Late): Co11027, CoH 11263, CoLK 11205, CoLK 11206, CoPb 11213, CoPb 11214, CoS 11232

(b) Varieties graded as resistant/ moderately resistant by plug method of inoculation with Cf 09

AVT (E-I P): CoS10231

AVT (E-II P): CoH09262, CoH 09263, CoLK 09202, CoPb 09181, CoS 09246.

AVT (M-I P): CoPant 10262, CoPant 10221, CoPb 10181

AVT (M-II P): Co09022, CoH 09264, CoLK 09204, CoPb 09714, CoS 09232.

IVT (Early): CoLK11202, CoPb11212

IVT (Mid-Late): Co11027, CoH 11263, CoLK 11205, CoLK 11206, CoPb 11213, CoPb 11214, CoS 11232

c) Varieties graded as resistant/ moderately resistant by Nodal cotton Swab method of inoculation with Cf 08.

AVT (E-I P): Co10035, CoH10261, Co0238, CoS10231

AVT (E-II P): CoH09262, CoH 09263, CoLK 09202, CoPb 09181, CoS 09246

AVT (M-I P): Co10036, CoPant 10262, CoPant 10221, CoPb 10181, CoS767, CoS 8436

AVT (M-II P): Co09022, CoH 09264, CoLK 09204, CoPb 09714, CoS 09232.

IVT (Early): CoLk11201, CoLk 11202, CoLk11203, CoPb11212

IVT (Mid-Late): Co11026, Co11027, CoH11263, CoH11264, CoLk11204, CoLk11205, CoLk11206, CoPb11181, CoPb11213, CoPb11214, CoS11231, CoS11232.

(d) Varieties graded as resistant/ moderately resistant by Nodal cotton Swab method of inoculation with Cf 09.

AVT (E-I P): Co10035, CoH10261, Co 0238, CoS10231

AVT (E-II P): CoH09262, CoH 09263, CoLK 09202, CoPb 09181, CoS 09246, CoJ64

AVT (M-I P): Co10036, CoPant 10262, CoPant 10221, CoPb 10181, CoS767, CoS8436

AVT (M-II P): Co09022, CoH 09264, CoLK 09204, CoPb 09714, CoS 09232 .

IVT (Early): CoLk11201, CoLk 11202, CoLk11203, CoPb11212

IVT (Mid-Late): Co11026, Co11027, CoH11263, CoLK11204, CoLk11205, CoLk11206, CoPb11181, CoPb11213, CoPb11214, CoS11231, CoS11232

B- SMUT

All the entries of IVT (M), IVT (E), AVT (E-I P) , AVT(E-II P), AVT (M-I P) and AVT (M-II P) were tested against smut also, teliospores from commercially cultivated sugarcane varieties were collected and filled in blotting paper bags and stored in desiccators under 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 panting. The incidence of the smut was recorded fortnightly on the clump basis of each row on different varieties (Table-2).

Varieties found R/MR to smut

AVT (E-I P): Co10035, CoH10261, CoS10231, CoJ64, CoPant 84211, Co0238

AVT (E-II P): CoH09262, CoH 9263, CoLk09202, CoPb09181, CoS09246, CoJ64, CoPant84211

AVT (M-I P): Co10036, CoPant 10262, CoPant 10221, CoPb 10181, CoS767, CoS8436, Co10182, CoPant 9722

AVT (M-II P): Co09022, CoH 09264, CoLK 09204, CoPb 09714, CoS 09232

IVT (Early): CoLk11201, CoLk 11202, CoLk11203, CoPb11212, CoH11261, CoH11262, CoPb11211.

IVT (Mid-Late): Co11026, Co11027, CoH11263, CoH11264, CoLK11204, CoLK11205, CoLk11206, CoPb11181, CoPb11182, CoPb11213, CoPb11214, CoS11231, CoS11232

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

During the survey of western and central Uttar Pradesh, the natural incidence 10-20 percent of red rot disease was recorded on CoS 8436 and CoS 07250 from Gola factory zone (Lakhimpur Kheri). This disease was reported on CoS 8436 and CoJ 88 from Baheri (Bareilly) and Tilhar (Shahjahanpur) factory zones respectively and its incidence 5-7 percent. This disease was also reported on Co 1148 from Deoband and Shamli 0.5 to 15 percent.

Smut disease reported upto 40% from village Sharifnagar, Baheri (Bareilly) on variety CoSe 98231. 2-5 percent of smut disease reported from Gola, factory zone (Lakhimpur-Kheri), Tilhar (Shahjahanpur) and Balrampur on CoS 91269, CoSe 92423 and CoSe 98231 respectively. Smut disease was also reported from Shamli district and Shabitarh (Bulandshar) on CoS 07250, CoSe 01434 and CoSe 98231 in stray.

Wilt disease was observed about stray to 5 percent on CoS 07250 and CoS 8436 in Gola (Lakhimpur-Kheri) and Bareilly.

Natural incidence of Grassy shoot disease reported in almost all the sugarcane cultivars and its incidence varied from 2-5 percent in central and western part of Uttar Pradesh. Heavy incidence of GSD 20-25 percent in Tikola (Muzaffarnagar) on Variety CoS 767.

Natural incidence of Pokkah boeng disease reported in almost all the brought leaf of sugarcane and incidence varied from 15-20 percent on varieties CoSe 01434, CoS 08279 and Co 0238 from Sugarcane Research Institute Farm, Shahjahanpur.

Natural incidence of stinking rot disease was observed on variety CoS 08279 from Sugarcane Research Institute Farm, Shahjahanpur.

Three percent incidence of sugarcane mosaic virus was reported from Nigohi (Shahjahanpur) area of variety CoLk 94184.

Natural incidence 0.5-5.0 percent pineapple/sett rot disease was recorded on Co 98014 and Co 0238 from Titawi (Shamli) and Gagnauli (Saharanpur). Heavy incidence of pineapple/sett rot 25-30 percent at Titawi (Saharanpur) in variety CoJ 88.

Rust disease was reported 5-10 percent on variety CoS 767 in Shamli district and Mawana (Meerut) respectively.

Project No. : PP 23

Project title : Assessment of elite and ISH genotypes for resistance to red rot.

Objective : To gather information on *Saccharum* sp. and elite genotypes for resistance to red rot so that the resistant genotypes could be used in breeding programme as possible donor for resistance.

Year of start : 1996-97

Location : Shahjahanpur

Report

Four ISH genotypes namely ISH 338, ISH 280, ISH 208 and ISH 291 were tested by plug method of inoculation with Cf 08 and Cf 09 pathotypes separately and all were found moderately resistant.

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

A total number of 14 popular commercial varieties were planted in this experiment during crop season 2014-15. All the varieties having infection of *Pokkah boeng* with stray to mild but out of these some varieties like CoSe 01434, Co 0238 and CoS 07279 found to be badly affected with *Pokkah boeng* and scored as susceptible category. Only two varieties i.e. Co 0118 and CoS 8436 scored in MS category. Rest of the varieties having chlorotic streaked, curling and twisting on leaves at various intensities with top rot and rated as resistant category (Table-5).

It has been observed that the incidence of *pokkah boeng* disease appears after the starting of rain fall with high humidity and average temperature. The maximum intensity of symptoms was observed at temperature 33.7 (Max.), 26.3 (Min.), relative humidity 80.8% and 321.0 mm rainfall in the month of July (Table-6). Rainfall and high humid condition play a major role in incidence of disease. However; symptoms were also noticed in different locations after monsoon period with stray condition during survey.

Table-1: Pathogenic behaviour of *C. falcatum* pathotypes/isolates on host differentials (2014-15) Shahjahanpur

S N	Isolates	Source	Reaction on host differentials														Tallied with pathotype
			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	
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 1301	CoSe 92423	X	X	S	S	R	R	X	S	S	R	R	R	S	R	Cf 09
11	R 1302	CoLK 8102	X	S	S	S	S	S	S	S	X	R	R	R	S	R	Cf 08
12	R 1303	CoSe 98231	X	S	S	S	S	S	S	S	X	R	R	R	S	R	Cf 08
13	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																	

**Table-2: Evaluation of Pre-zonal/ Zonal genotypes/varieties to red rot and smut (2014-15)
Shahjahanpur**

S N	Genotypes/ Varieties	Reaction against Red rot				Reaction to smut
		Plug method		Nodal Cotton swab		
		Cf 08	Cf 09	Cf 08	Cf 09	
1	2	3	4	5	6	7
AVT(E-I Plant)						
1	Co 10035	MS	S	MR	MR	R
2	CoH10261	MS	MS	MR	MR	R
3	CoS10231	MR	MR	R	R	R
4	CoJ 64	HS	MS	S	S	R
5	CoPant84211	HS	S	S	MS	R
6	Co0238	MS	MS	MR	MR	R
AVT(E-II Plant)						
1	CoH 09262	MR	MR	R	R	R
2	CoH 09263	MR	MR	R	R	MR
3	CoLk 09202	MR	MR	R	R	R
4	CoPb 09181	MR	MR	R	R	R
5	CoS 09246	MR	MR	R	R	R
6	CoJ 64	HS	HS	S	R	R
7	CoPant 84211	HS	HS	S	MS	R

Table-2: Evaluation of Pre-zonal/ Zonal genotypes/varieties to red rot and smut (2014-15) at Shahjahanpur

S N	Genotypes/ Varieties	Reaction against Red rot				Reaction to smut
		Plug method		Nodal Cotton swab		
		Cf 08	Cf 09	Cf 08	Cf 09	
1	2	3	4	5	6	7
AVT (M-I Plant)						
1	Co10036	MS	MS	MR	MR	R
2	CoPant 10262	MR	MR	R	R	R
3	CoPant 10221	MR	MR	R	R	R
4	CoPb10181	MR	MR	R	R	R
5	CoPb10182	HS	HS	MS	MS	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
AVT(M-II Plant)						
1	Co09022	MR	MR	R	R	MR
2	CoH09264	MR	MR	R	R	R
3	CoLk09204	MR	MS	R	MR	R
4	CoPb09714	MR	MS	R	MR	MR
5	CoS09232	MR	MR	R	R	R
IVT(Early)						
1	CoH11261	HS	HS	S	S	R
2	CoH11262	HS	HS	S	S	R
3	CoLk11201	MS	MS	MR	MR	R
4	CoLk11202	MR	MR	R	R	R
5	CoLk11203	MS	MS	R	R	R
6	CoPb11211	HS	HS	S	S	R
7	CoPb11212	MR	MR	R	R	R (Wilt)
IVT (Mid late)						
1	Co11026	MS	MS	MR	R	R
2	Co11027	MR	MR	R	R	R
3	coH11263	MR	MR	R	R	R
4	CoH11264	MS	S	MR	MS	R
5	CoLk11204	MS	MS	MR	MR	R
6	CoLk11205	MR	MR	R	R	R (Wilt)
7	CoLk11206	MR	MR	R	R	R
8	CoPb11181	MS	MS	MR	MR	R (Wilt)
9	CoPb11182	HS	S	S	MS	R
10	CoPb11213	MR	MR	R	R	R
11	CoPb11214	MR	MR	R	R	R
12	CoS11231	MS	MS	MR	MR	R
13	CoS11232	MR	MR	R	R	R

Table-3: Situation on different sugarcane diseases in central and western U.P. (2014-15)

S N	Name of Diseases	Varieties affected	Incidence (%)	Factory Zones/Districts
1	Red rot	CoJ 88 CoH 8436 CoS 07250 CoS 8436 CoS 8436 Co 1148 Co 1148	5% 7% 10% 20% 5% 5-15% 0.5-5.0%	Vill. Diuria, Tilhar (Shahjahanpur) Vill. Capsera, Tilhar (Shahjahanpur) Mohammadi (Kheri) Sri Paramjeet Singh, Gola (Kheri) Baheri,(Bareilly) Deoband Shamli
2	Smut	CoS 91269 CoSe 92423 CoSe 98231 CoSe 98231 CoS 07250 CoSe 01434 CoSe 98231	2% 3% 40% 5% Stray Stray stray	Gola (Kheri) Tilhar (Shahjahanpur) Vill. Sharifnagar, Baheri (Bareilly) Balrampur Shamli Shamli Shabitgarh
3	Wilt	CoS 8436 CoS 07250	5% Stray	Gola (Kheri) Baheri (Bareily)
4	G.S.D.	CoS 08279 Co 0238 CoS 97261 CoS 01434 Co 1148, CoS 767, Co 0238, CoJ 88, CoS 03251, CoSe 03234 CoS 767 Co 0238, Co 98014, CoS 07250, CoS 767, CoSe 01434 Co 0238 CoS 767 Co 0238, Co 98014, CoS 767	5% 5% 3% 2% Stray to 2.0% 10-15% 0.2-10% 0.5-20% 20-25% 0.5-8%	SRI Farm (Shahjahanpur) Baheri (Bareilly) Katya Sadat (Ghazipur) Sultanpur Deoband, Gagnauli, Khatauli Titawi Shamli Mawana Tikola Mawana, Shabitgarh
5	Pokkah boeng	Co 98014 Co 0238 Co 0238 Co 0238 Co 0118 CoSe 03251 Co 98014 Co 05011 CoS 8436 CoSe 01434 CoS 08279 CoS 08272 Co 0238 Co 0118 CoJ 85 Co 98014 Co 05011 CoS 8436	3% 3% 7% 20% 5-8% 1-2 % 4.0 % 5.0 % 5.0 % 15.0 % 15.0 % 2.0% 4.0% 2.0% 3.0% 2.0% 2.0% 4.0%	Baheri Bareilly Hargaon Baheri, Bareilly SRI Farm (Shahjahanpur) SRI Farm (Shahjahanpur) SRI Farm (Shahjahanpur) SRI Farm (Shahjahanpur) SRI Farm (Shahjahanpur) SRI Farm (Shahjahanpur) SRI Farm (Shahjahanpur) SRI Farm (Shahjahanpur) SRI Farm (Shahjahanpur) Sugarcane Research Farm Gola (Kheri) Sugarcane Research Farm Gola (Kheri) Farmer field (Kheri) Sugarcane Research Farm Gola (Kheri) Sugarcane Research Farm Gola (Kheri) Sugarcane Research Farm Gola (Kheri)

		CoSe 98231	2.0%	Sugarcane Research Farm Gola (Kheri)
		CoSe 05125	2.0%	Sugarcane Research Farm Gola (Kheri)
		CoSe 01434	5.0%	Sugarcane Research Farm Gola (Kheri)
		CoS 07250	2-5 %	Hargaon sugar factory zone, Sitapur
		CoS 07250	2-3%	Biswan sugar factory zone, Sitapur
		CoSe 92423	2%	K.M. Sugar factory zone, Faizabad
		CoS 91269	3%	K.M. Sugar factory zone, Faizabad
		CoS 08279	10 %	SRI Farm (Shahjahanpur)
		CoLk 94184	3%	Nigohi (Shahjahanpur)
6	Rust	CoS 767	5-10%	Shamli, Mawana
7	Pineapple / Sett rots	Co 98014, Co 0238 CoJ 88	0.5-5.0% 25-30%	Titawi, Gagnauli Titawi
8	Stinking rot	CoS 08279	10%	SRI Farm (Shahjahanpur)
9	Mosaic	CoLk 94184	3%	Nigohi (Shahjahanpur)

Table-4: Screening of ISH genotypes against Red rot during 2014-15 (Shahjahanpur)

S. N.	Genotypes	Plug method	
		Cf 08	Cf 09
1	ISH 338	MR	MR
2	ISH 280	MR	MR
3	ISH 208	MR	MR
4	ISH 291	MR	MR

Table-5: Reaction of different sugarcane varieties against *Pokkah boeng* disease under natural condition

S. N.	Varieties	Percent infected plants				Disease reaction
		Mild	Moderate	Severe	Total incidence	
01	Co 0118	8	-	-	8	MS
02	CoSe 01434	4	6	5	15	S
03	CoS 07250	5	-	-	5	R
04	CoSe 01424	2	-	-	2	R
05	UP 05125	2	-	-	2	R
06	Co. 0238	5	10	5	20	S
07	CoS 09231	3	-	-	3	R
08	CoS 10231	2	-	-	2	R
09	CoS 08279	5	5	5	15	S
10	Co. 98014	4	-	-	4	R
11	CoSe 96436	2	-	-	2	R
12	CoS 09246	2	-	-	2	R
13	Co.05011	5	-	-	5	R
14	CoS 8436	8	-	-	8	MS

Table-6: Meteorological data at Sugarcane Research Institute, Shahjahanpur during April, 2014 to March, 2015

SN	Month	Rain fall (mm)	Temperature °C		Relative humidity % (Mean)
			Maximum	Minimum	
01	April, 2014	7.8	35.4	19.7	50.1
02	May, 2014	9.2	38.1	24.4	42.56
03	June, 2014	19.0	39.8	26.6	53.9
04	July, 2014	321	33.7	26.3	80.8
05	August, 2014	47.6	35.0	26.4	75.9
06	September, 2014	80.4	33.7	24.4	78.8
07	October, 2014	31.0	32.1	18.7	73.8
08	November, 2014	Nil	28.6	10.4	79.0
09	December, 2014	12.0	19.9	6.3	87.1
10	January, 2015	28.5	17.0	7.4	88.9
11	February, 2015	Nil	25.1	11.8	76.0
12	March, 2015	76.0	28.9	15.5	71.4