

**ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE
2013-14**

**Technical Report
Plant Pathology, Shahjahanpur**

Periods : **2013-14**
Staff position : Senior Scientific Assistant (Plant Pathology)
Financial allocation sanctioned : Yes
expenditure- Whether data with past
background and correlation with past
fluctuation to data obtained

Project No.	:	PP 14
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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

Three red rot isolates viz., R 1102(CoS 8436), R 1201(CoSe95422 Balrampur) and R 1202 (CoS 8436), were tested for their pathogenic variability along with designated pathotypes viz; Cf 01, Cf 07, Cf 08, Cf 09 and Cf 11 on prescribed 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 was found similar to existing pathotype Cfy08. Remaining two isolates i.e; R1102 (CoS 8436 from Gola-Kheeri) and R 1202 (CoS 8436 from Tilher-Shahjahanpur) were similar to R 0401 isolates from CoS 8436 Gola which were distinct in reaction on differential from existing pathotypes.

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 varieties of IVT (M), 05 varieties of IVT (E), 07 varieties of AVT (E-I P), 05 varieties of AVT (E-II P), 08 varieties of AVT (M-I P) and 07 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): CoH 09262, CoLk 09202, CoPb 09181, CoS 09246 and CoH 09263

AVT (E-II P): CoPb 08211, CoPb 08212.

AVT (M-I P): Co 09022, CoH 09264 CoLk 09204, CoPb 09214, CoS 09232, CoS 767, CoS 8436, CoPant 97222

AVT (M-II P): CoH 08262, CoS 08234, and CoS 08235.

IVT (Early): CoH 10261 and CoS10231.

IVT (Mid-Late): Co 10037, CoH 10262, CoPant 10221, CoPb 10181, CoS 767, CoS 8436, CoPant 97222

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

AVT (E-I P): CoH 09262, CoLk 09202, CoPb 09181, CoS 09246 and CoH 09263

AVT (E-II P): All varieties are MS, S, and HS.

AVT (M-I P): Co 09022, CoH 09264, CoS09232 and CoPant 97222.

AVT (M-II P): CoH 08262, CoS 08234, CoS 08235, CoPant 97222.

IVT (Early): CoS 10231.

IVT (Mid-Late): CoH 10262, CoPant 10221, CoPb 10181, CoS 8436 and CoPant 97222

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

AVT (E-I P): CoH 09262, CoLk 09202, CoPb 09181, CoS 09246 and CoH 09263

AVT (E-II P): CoPb 08211, CoPb 08212

AVT (M-I P): Co 09022, CoH 09264, CoS09232, CoPant 97222, CoLk 09204, CoPb09214, CoS767 and CoS 8436

AVT (M-II P): CoH 08262, CoH08264, CoPb 08217, CoS 08234, CoS08235.

IVT (Early): Co 10035, CoH 10261, CoS 10231.

IVT (Mid-Late): Co 10036, Co 10037, Co 10039, CoH10262, CoPant 10221, CoPb 10181 CoPb 10211, CoS 767, CoS 8436, CoPant 97222.

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

AVT (E-I P): CoH 09262, CoLk 09202, CoPb 09181, CoS 09246 and CoH 09263

AVT (E-II P): CoPb 08211, CoPb 08212

AVT (M-I P): Co 09022, CoH 09264, CoLk 09204, CoPb 09214, CoS09232 and CoPant 97222.

AVT (M-II P): CoH 08262, CoS 08234, CoH08264, CoS 08235 and CoPant 97222.

IVT (Early): CoH 10261, CoS 10231.

IVT (Mid-Late): Co 10036, Co 10037, CoH10262, CoPant 10221, CoPb 10181 CoPb 10211, CoS 8436, CoPant 97222.

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): CoH 09262, CoLk 09202, CoPb 09181, CoS 09246, CoH 09263, CoJ 64,CoPant84211

AVT (E-II P): CoPb 08211, CoPb 08212,CoPb 08233,CoJ 64,CoPant 84211.

AVT (M-I P): Co 09022, CoH 09264,CoLk 9204,CoPb 09214, CoS 092323,CoS 8436, CoPant 97222.

AVT (M-II P): CoH 08263, CoH08264,CoPant 97222.

IVT (Early): Co 10035, CoH 10261,CoJ 64, CoPant 84211.

IVT (Mid-Late): Co 10036, Co 10037, Co 10039, CoH10262,CoH 10263, CoPant 10221, CoPb 10181, CoPb 10182, CoPb 10183. CoS767, CoS 8436, CoPant 97222.

Check (smut susceptible), Co 1158 was used as susceptible check & found highly susceptible to smut.

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 on variety CoS 8436 from Gularia and gola factory area under district Lakhimpur(Kheri) and its incidence varied from 30-40%. 10 to 15 % incidence was noticed in CoSe 92423 from gularia and mankapur (Gonda) respectively. 12 to 20% incidence was found in CoSe 98231 from Gularia. 30 to 35% incidence was noticed in gularia and gola in CoS 07250. Smut has been reported upto 10-15% from few pockets of Gularia and Mankapur in varieties CoS 91269 and CoSe 92423 respectively. Wilt has been reported from Gola upto 5-10% in varieties CoS 07250 and CoS 8436.

GSD have been reported in almost all the sugarcane cultivars and its incidence varied from 10 to 40 percent in central part of Uttar Pradesh.

Stray cases of Pokkah Boeng disease (PBD) were reported on varieties CoS 01424, CoS 08279, CoS 08272 CoSe 96436, CoS 97261, CoS 96268, CoSe 98231, Co.98014, CoS 07250 and CoS 91269 from Shahjahanpur, Sultanpur, Balrampur, Gonda, Faizabad and Badaun. 25 to 30 % incidence of PBD was recorded in variety CoS 03251 at Shahjahanpur and Co.0238 from Bisalpur (Pilibhit) Knife cut disease was also observed in varieties CoPb 09181 and CoPb 08217 in stray from Shahjahanpur farm.

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

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

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 of number of 10 varieties were screened out during the crop season 2013-14 with mild infection (Table-6). All the infected varieties have chlorotic streaks, curling and twisting on leaves at various intensities. No symptoms of top rot and wilting of stalks have been observed in planted sett.

It has been observed that the incidence of *pokkah boeng* disease appears after the starting of rain fall with high humidity and low temperature. The maximum intensity of symptoms was observed at temperature 32.8 (Max.), 26.3 (Min.), relative humidity 83.0% and 489.0 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.

Table-1: Pathogenic behaviour of *C. falcatum* pathotypes/isolates on host differentials (2013-14) 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 1202	CoS 8436	S	S	S	X	R	S	S	S	R	S	R	R	S	R	New
R-Resistant, X- Intermediate, S- Susceptible																	

Note: Pathotypes Cf 02 and Cf 03 were deteriorated at our center therefore the inoculation with these pathotypes could not be done during this year. The reaction of these pathotypes on above differential well known which has been displayed in this table for comparing the new isolates.

**Table-2: Evaluation of Pre-zonal/ Zonal genotypes/varieties to red rot and smut (2013-14)
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	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	S	S	MS	MS	R
7	CoPant 84211	HS	HS	S	S	R
AVT (E-II Plant)						
1	CoPb 08211	MR	MS	R	MR	R
2	CoPb 08212	MR	MS	R	MR	R
3	CoS 08233	S	S	MS	MS	R
4	CoJ 64	HS	S	S	MS	R
5	CoPant 84211	S	HS	MS	S	R

Table-2: Evaluation of Pre-zonal/ Zonal genotypes/varieties to red rot and smut (2013-14) 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	Co 09022	MR	MR	R	R	MR
2	CoH 09264	MR	MR	R	R	R
3	CoLk 09204	MR	MS	R	MR	R
4	CoPb 09214	MR	MS	R	MR	MR
5	CoS 09232	MR	MR	R	R	R
6	CoS 767	MR	S	R	MS	MS
7	CoS 8436	MR	S	R	MS	R
8	CoPant 97222	MR	MR	R	R	R
AVT(M-II Plant)						
1	CoH 08262	MR	MR	R	R	S
2	CoH 08263	S	S	MS	MS	R
3	CoH 08264	MS	S	MR	MR	R
4	CoPb 08217	MS	S	MR	MS	S
5	CoS 08234	MR	MR	R	R	MS
6	CoS 08235	MR	MR	R	R	MS
7	CoPant 97222	NG	MR	NG	R	R
8	Co 1158	-	-	-	-	HS
IVT(E)						
1	Co10035	MS	S	MR	MS	R
2	CoH10261	MR	MS	R	MR	R
3	CoS10231	MR	MR	R	R	S
4	CoJ64	HS	S	S	MS	R
5	CoPant84211	HS	HS	S	S	R
IVT (M)						
1	Co10036	MS	MS	MR	MR	R
2	Co10037	MR	MS	R	MR	R
3	Co10039	MS	S	MR	MS	R
4	CoH10262	MR	MR	R	R	R
5	CoH10263	HS	HS	S	S	R
6	CoPant10221	MR	MR	R	R	R
7	CoPb10181	MR	MR	R	R	R
8	CoPb10182	HS	HS	S	S	R
9	Copb 10183	HS	HS	S	S	R
10	CoPb 10211	MS	MS	MR	MR	S
11	CoS 767	MR	S	R	MS	R
12	CoS 8436	MR	MR	R	R	R
13	CoPant 97222	MR	MR	R	R	R

Table-3: Situation on different sugarcane diseases in central and western U.P. (2013-14)

S. N.	Name of Diseases	Varieties affected	Incidence (%)	Factory Zones/Districts
1	Red rot	CoS 8436 CoSe 92423 CoSe 98231 CoS 07250 CoSe 01235	30-40 % 10-15 % 12-20 % 30-35 % 10-15 %	Gularia, Gola, Gularia, Mankapur, Gularia, Gulria, Gola, Balrampur
2	Smut	CoSe 92423 CoS 91269	2-5 % 10-15 %	Gularia, Mankapur, Badaun
3	Wilt	CoS 07250 CoS 8436	5-10% 5-10%	Gola
4	G.S.D.	CoS 91269, CoS 8436, CoSe 92423, UP 9530, CoSe 01434, CoSe 01424, Co 0238, CoSe 95422 CoS 91269 Co 0238	10-40 % 20-50 % 10-20 %	Faizabad Badaun Gularia, Gola
5	Pokkah boeng	CoSe 01434 CoS 03251 Co 0238 Co 0238 CoSe 01424, CoS 08279, CoS 08272, Co 0239, CoSe 96436, CoS 97261, CoSe 96268, CoSe 98231, Co 98014, CoS 07250, CoS 91269	20 % 40 % 30 % 40 % Stray-5 %	Shahjahanpur Farm Shahjahanpur Farm Shahjahanpur Farm Bisalpur (Pilibhit) Shahjahanpur, Sultanpur, Balrampur, Gonda, Faizabad, Badaun
	Knife Cut	CoPb 09181, S. 2894/10, CoPb 08217, S. 4386/07	Stray	Shahjahanpur Farm

Table-4: Screening of ISH genotypes against Red rot during 2013-14 (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
5	ISH 263	MS	MS
6	ISH 174	MS	MS
7	ISH 975	S	S
8	ISH 298	MS	MS

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	7	-	-	7	MS
02	CoSe 01434	8	-	-	8	MS
03	CoS 07250	2	-	-	2	R
04	CoSe 01424	3	-	-	3	R
05	UP 05125	2	-	-	2	R
06	CoS 07240	3	-	-	3	R
07	Co. 0238	9	-	-	9	MS
08	CoS 09231	2	-	-	2	R
09	CoS 10231	1	-	-	1	R
10	CoS 08279	3	-	-	3	R

Table-6: Meteorological data at Sugarcane Research Institute, Shahjahanpur during April, 2013 to March, 2014

S.N.	Month	Rain fall (mm)	Temperature °C		Relative humidity %
			Maximum	Minimum	
01	April, 2013	4.0	38.6	20.0	44.0
02	May, 2013	8.2	40.0	25.3	41.0
03	June, 2013	285.0	34.1	25.5	72.0
04	July, 2013	489.0	32.8	26.3	83.0
05	August, 2013	274.0	33.0	26.0	84.0
06	September, 2013	89.8	33.4	24.9	79.5
07	October, 2013	27.0	31.3	20.2	74.5
08	November, 2013	6.6	27.2	12.5	69.0
09	December, 2013	11.4	22.4	8.9	75.0
10	January, 2014	37.6	17.8	9.2	87.0
11	February, 2014	11.6	22.0	10.9	76.0
12	March, 2014	18.6	29.0	15.3	60.5

