

Annual Report

(2015-16)

PLANT PATHOLOGY

(All India Coordinated Research Project on Sugarcane)

Division of Crop Protection

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Contents

Project No.	Title of the Project	Page No.
PP 14	Identification of pathotypes in red rot pathogen	2-5
PP17	Evaluation of Zonal Varieties for red rot, smut and wilt	6-12
PP 22	Survey of sugarcane diseases naturally occurring in the area on important varieties	13

PP 14: Identification of pathotypes in red rot pathogen

During 2015-16, 20 new isolates *i.e.* six isolates from CoLk 8102 (IR - 108, IR - 109, IR - 110, IR - 111, IR - 112 and IR - 113); five isolates from CoLk 94184 (IR - 116, IR - 117, IR - 118, IR - 119 and IR - 120); three isolates from CoS 92423 (IR - 103, IR - 104 and IR - 105); two isolates from Co 0238 (IR - 101 and IR - 102); two isolates from CoJ 85 (IR - 114 and IR - 115) and one isolate each from CoS 91269 (IR - 107) and CoS 8436 (IR - 106) were evaluated for their virulence on 14 designated differentials *viz.*, Co 419, Co 975, Co 997, Co 1148, Co 7717, Co 62399, CoC 671, CoJ 64, CoS 767, CoS 8436, BO 91, Khakai (*S. sinense*), Baragua (*S. officinarum*) and SES-594 (*S. spontaneum*) by plug method of inoculation. The virulence pattern of the isolates more or less matched with the existing pathotypes of this zone. Hence, there is no emergence of any new virulent pathotype in this zone.

Table-1: Reaction of pathotypes on a set of differentials

S. No.	Pathotype	Source	Co 419	Co 975	Co 997	Co 1148	Co 62399	Co 7717	CoC 671	CoJ 64	CoS 767	BO 91	Baragua	Khakai	SES 594	CoS 8436
1.	Cf 01	Co 1148	R	S	S	S	S	R	S	S	R	R	R	S	R	-
2.	Cf 02	Co 7717	I	R	S	R	I	S	S	I	R	R	R	R	R	-
3.	Cf 03	CoJ 64	R	R	S	R	R	R	R	S	R	R	R	R	R	-
4.	Cf 04	Co 419	S	S	S	S	R	S	S	S	R	R	R	S	R	-
5.	Cf 05	Co 997	R	S	S	S	R	R	S	S	R	R	R	S	R	-
6.	Cf 06	CoC 671	R	S	S	S	R	R	S	S	R	R	S	S	R	-
7.	Cf 07	CoJ 64	I	R	S	S	R	R	I	S	R	R	R	S	R	-
8.	Cf 08	CoJ 64	I	S	S	S	S	S	S	S	I	R	R	S	R	-
9.	Cf 09	CoS 767	I	R	I	S	R	R	I	S	S	R	R	S	R	-
10.	Cf 10	85A261	S	S	S	I	S	S	S	S	R	R	R	R	R	I
11.	Cf 11	CoJ 64	S	I	S	I	I	S	I	S	I	I	I	I	R	I

Table-2: Reaction of isolates on a set of differentials

S. No.	Isolates	Source	Co 1148	Co 7717	CoJ 64	Co 419	Co 997	CoC 671	Co 975	Co 62399	BO 91	CoS 767	Baragua	Khakai	SES 594	CoS 8436
1	IR-101	Co 0238	R	I	S	S	R	S	R	S	R	R	R	S	R	S
2	IR-102	Co 0238	R	R	S	S	R	S	R	S	R	R	S	S	R	I
3.	IR-103	CoS 92423	R	R	S	S	R	S	R	R	R	R	R	S	R	I
4.	IR-104	CoS 92423	R	S	S	S	R	S	R	R	R	R	R	S	R	R
5.	IR-105	CoS 92423	R	S	S	S	R	S	R	I	R	R	R	S	R	R
6	IR-106	CoS 8436	R	S	S	S	R	S	R	R	R	R	R	S	R	S
7.	IR-107	CoS 91269	R	I	R	S	R	S	R	S	R	R	R	S	R	R
8.	IR-108	CoLk 8102	R	S	I	S	I	S	R	S	R	R	R	I	R	R
9.	IR-109	CoLk 8102	R	S	I	S	I	S	R	S	R	R	R	I	R	R
10.	IR-110	CoLk 8102	R	S	S	S	I	S	R	S	R	R	R	I	R	R
11.	IR-111	CoLk 8102	R	S	I	S	I	S	R	S	R	R	R	I	R	R
12.	IR-112	CoLk 8102	R	S	S	I	I	S	R	S	R	R	R	I	R	R
13.	IR-113	CoLk 8102	R	S	S	S	I	S	I	S	R	R	R	S	R	R

14	IR-114	CoJ 85	S	S	S	S	R	S	I	S	R	R	R	S	R	R
15	IR-115	CoJ 85	I	S	S	I	R	I	R	R	R	R	R	S	R	R
16	IR-116	CoLk 94184	R	S	S	I	R	I	R	R	R	R	R	S	R	R
17	IR-117	CoLk 94184	R	R	S	S	R	R	R	R	R	R	R	S	R	R
18	IR-118	CoLk 94184	R	R	S	S	R	R	R	R	R	R	R	S	R	R
19	IR-119	CoLk 94184	R	R	S	I	R	R	R	R	R	R	R	S	R	R
20	IR-120	CoLk 94184	R	R	S	S	R	R	R	R	R	R	R	S	R	R

PP17: Evaluation of Zonal Varieties for red rot, smut and wilt

A. Location: IISR, Lucknow (North West Zone)

Forty three genotypes i.e. 10 Initial Varietal Trial (Early) *viz.*, Co 12026, Co 12027, CoH 12261, CoLk 12201, CoLk 12202, CoLk 12203, CoLk 12204, CoPant 12221, CoPant 12222 and CoS 12231; 4 Advanced Varietal Trial (Early)-I Plant *viz.*, CoH 11262, CoLk 11201, CoLk 11202 and CoLk 11203; 3 Advanced Varietal Trial (Early)-II Plant *viz.*, Co 10035, CoH 10261 and CoS 10231; 15 Initial Varietal Trial (Mid late) *viz.*, Co 12028, Co 12029, CoH 12262, CoH 12263, CoLk 12205, CoLk 12206, CoPant 12223, CoPant 12224, CoPant 12225, CoPant 12226, CoPb 12281, CoPb 12182, CoPb 12211, CoPb 12212 and CoS 12232; 6 Advanced Varietal Trial (Mid late)-I Plant *viz.*, Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoPb 11214 and Co S 11232; 5 Advanced Varietal Trial (Mid late)-II Plant *viz.*, Co 10036, CoH 10262, CoPant 10221, CoPb 10181 and CoPb 10182 were screened against red rot, smut and natural infection of wilt and yellow leaf disease along with susceptible checks *viz.*, CoJ 64 (Cf 07 and 08) and CoS 767(Cf 09) for red rot and CoLk 7701 and C0 1158 for smut (Table-1).

(i) Red rot:

Two cane stalks in each of the twenty five clumps were inoculated by plug and nodal methods of inoculation as per technical programme. The cane stalks were split open longitudinally after 60 days of inoculation and observation on spread of disease was recorded on 0-9 scale.

In Initial Varietal Trial (Early), all the genotypes were moderately resistant (MR) by plug method and resistant (R) by nodal method against the pathotype Cf 08. Whereas all the genotypes except CoLk 12202 and CoPant 12221 were moderately resistant (MR) by plug method and resistant (R) by nodal method against the pathotype Cf 09. Colk 12202 was moderately susceptible (MS) by plug method as well as nodal method whereas CoPant 12221 was highly susceptible (HS) by plug method and susceptible (S) by nodal method against Cf 09.

In Advanced Varietal Trial (Early)–I Plant, three genotypes *viz.*, CoLk 11201, CoLk 11202 and CoLk 11203 were moderately resistant (MR) and CoH 11262 was highly susceptible (HS) against Cf 08 by plug method. Two genotypes CoLk 11201 and CoLk 11202 were moderately susceptible (MS) whereas CoH 11262 was highly susceptible (HS) and CoLk 11203 was moderately resistant (MR) against Cf 09 by plug method. All the genotypes except CoH

11262 were resistant (R) against Cf 08 and moderately resistant (MR) against Cf 09 by nodal method. CoH 11262 was susceptible (S) against both the pathotypes by nodal method.

In Advanced Varietal Trial (Early)-II Plant, all the three genotypes were moderately resistant (MR) by plug method against both the pathotypes. Again all the genotypes except Co 10035 were resistant (R) by nodal method against both the pathotypes. Genotype Co 10035 was resistant (R) against Cf 08 and moderately resistant (MR) against Cf 09 by the same method.

In Initial Varietal Trial (Mid late), out of fifteen genotypes tested, all the genotypes except CoS 12232 were moderately resistant (MR) against pathotype Cf 08 by plug method. Five genotypes viz., Co 12028, Co 12029, CoPant 12262, CoH 12263 and CoPb 12212 were moderately resistant (MR); four genotypes viz., CoLk 12205, CoLk 12206, CoPant 12224 and CoPb 12211 were moderately susceptible (MS); two genotypes namely CoPant 12225 and CoPb 12182 were susceptible (S) and four genotypes viz., CoH 12262, CoH 12263, CoPant 12223 and CoS 12232 were highly susceptible (HS) against Cf 09 by plug method. All the genotypes except CoH 12263, CoPb 12181 and CoS 12232 were resistant (R) whereas CoH 12263 and CoPb 12181 were moderately resistant (MR) and CoS 12232 was moderately susceptible (MS) against Cf 08 by nodal method. Five genotypes viz., Co 12028, Co 12029, CoPant 12226, CoPb 12181 and CoPb 12212 were resistant (R); three genotypes viz., CoLk 12205, CoPant 12224 and CoPb 12211 were moderately resistant (MR); three genotypes viz., CoLk 12206, CoPant 12225 and CoPb 12182 were moderately susceptible (MS) whereas four genotypes viz., CoH 12262, CoH 12263, CoPant 12223 and CoS 12232 were susceptible (S) against Cf 09 by nodal method.

In Advanced Varietal Trial (Mid late)-I Plant, 4 genotypes viz., Co 11027, CoH 11263, CoLk 11204 and CoPb 11214 were moderately resistant (MR) by plug method and resistant (R) by nodal method against both the pathotypes. Genotype CoS 11232 was rated as moderately susceptible (MS) against Cf 08 by both the methods and susceptible (S) against Cf 09 by both the methods. CoLk 11206 was moderately resistant (MR) and resistant (R) against Cf 08 by plug method and nodal method whereas moderately susceptible (MS) moderately resistant (MR) against Cf 09 by plug and nodal method, respectively.

In Advanced Varietal Trial (Mid late)-II Plant, all the 5 genotypes viz., Co 10036, CoH 10262, CoPant 10221, CoPb 10181 and CoPb 10182 were moderately resistant (MR) by plug method whereas resistant (R) by nodal method against both the test pathotypes.

(ii) Smut:

Three bud setts were dipped in teliospore suspension (10^6 spores/ml) for 30 minutes and planted as per technical programme. Smut incidence was recorded at fortnight intervals up to the harvest of the crop.

Out of forty three genotypes tested, eleven genotypes *viz.*, CoH 11262, CoLk 11203, CoS 10231, Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoPb 11214, Co 10036, CoH 10262 and CoPant 10221 were susceptible and rest 32 genotypes were tolerant to smut.

(iii) Wilt:

Natural incidence of wilt was observed in 17 genotypes *viz.*, Co 12026, CoH 12261, CoPant 12221, CoS 12231, CoS 10231, Co 12028, CoH 12262, CoH 12263, CoPant 12223, CoPant 12225, CoPant 12226, CoPb 12212, CoS 12232, Co 11027, CoH 10262, CoPant 10221 and CoPb 10181.

(iv) Yellow leaf disease (YLD):

Yellow leaf disease (YLD) incidence was also observed in Co 11027, Co S 11232 and CoPb 10181.

Table-1: Reaction of sugarcane genotypes against red rot, smut and wilt at IISR, Lucknow

Sl. No.	Genotype	Red Rot				Smut	Wilt	YLD
		Plug Method		Nodal Method				
		Cf 08	Cf09	Cf 08	Cf09			
Initial Varietal Trial (Early)								
1.	Co 12026	MR	MR	R	R		S	
2.	Co 12027	MR	MR	R	R			
3.	CoH 12261	MR	MR	R	R		S	
4.	CoLk 12201	MR	MR	R	R			
5.	CoLk 12202	MR	MS	R	MS			
6.	CoLk 12203	MR	MR	R	R			
7.	CoLk 12204	MR	MR	R	R			
8.	CoPant 12221	MR	HS	R	S		S	
9.	CoPant 12222	MR	MR	R	R			
10.	CoS 12231	MR	MR	R	R		S	
Advanced Varietal Trial (Early)-I Plant								
1.	CoH 11262	HS	HS	S	S	S		
2.	CoLk 11201	MR	MS	R	MR			
3.	CoLk 11202	MR	MS	R	MR			
4.	CoLk 11203	MR	MR	R	MR	S		
Advanced Varietal Trial (Early)-II Plant								
1.	Co 10035	MR	MR	R	MR			
2.	CoH 10261	MR	MR	R	R			
3.	CoS 10231	MR	MR	R	R	S	S	
Initial Varietal Trial (Midlate)								
1.	Co 12028	MR	MR	R	R		S	
2.	Co 12029	MR	MR	R	R			
3.	CoH 12262	MR	HS	R	S		S	
4.	CoH 12263	MR	HS	MR	S		S	
5.	CoLk 12205	MR	MS	R	MR			
6.	CoLk 12206	MR	MS	R	MS			
7.	CoPant 12223	MR	HS	R	S		S	
8.	CoPant 12224	MR	MS	R	MR			
9.	CoPant 12225	MR	S	R	MS		S	
10.	CoPant 12226	MR	MR	R	R		S	
11.	CoPb 12181	MR	MR	MR	R			
12.	CoPb 12182	MR	S	R	MS			
13.	CoPb 12211	MR	MS	R	MR			
14.	CoPb 12212	MR	MR	R	R		S	
15.	CoS 12232	S	HS	MS	S		S	
Advanced Varietal Trial (Mid late)-I Plant								
1.	Co 11027	MR	MR	R	R	S	S	S
2.	CoH 11263	MR	MR	R	R	S		
3.	CoLk 11204	MR	MR	R	R	S		
4.	CoLk 11206	MR	MS	R	MR	S		
5.	CoPb 11214	MR	MR	R	R	S		
6.	Co S 11232	MS	S	MS	S			S
Advanced Varietal Trial (Mid late)-II Plant								
1.	Co 10036	MR	MR	R	R	S		
2.	CoH 10262	MR	MR	R	R	S	S	
3.	CoPant 10221	MR	MR	R	R	S	S	
4.	CoPb 10181	MR	MR	R	R		S	S
5.	CoPb 10182	MR	MR	R	R			
Check	CoJ 64*	HS	S	S	S			
Check	CoS 767*	MR	S	R	S			
Check	Co 1158**	-	-	-	-	S		
Check	CoLk 7701**	-	-	-	-	S		

*: Check for red rot **: Check for smut

B. Location: IISR Regional Station, Motipur (North Central Zone)

In North Central Zone, 21 genotypes were screened against red rot at IISRRC, Motipur. Four Initial Varietal Trial (Early) *viz.*, CoLk 12207, CoLk 12208, CoP 12436 and CoP 12437; 4 Advanced Varietal Trial (Early)-I Plant *viz.*, CoP 11436, CoP 11437, CoP 11438 and CoSe 11451; 6 Initial Varietal Trial (Mid late) *viz.*, CoLk 09204, CoLk 12209, CoP 12438, CoP 12439, CoSe 12452 and CoSe 12453; 4 Advanced Varietal Trial (Mid late)-I Plant *viz.*, BO 155, CoSe 11453, CoSe 11454 and CoSe 11455; 3 Advanced Varietal Trial (Mid late)-II Plant *viz.*, CoSe 10451, CoSe 10452 and CoSe 10453 along with 4 standard checks *i.e.* BO 91, CoP 9301, CoSe 92423 and CoSe 95422 were evaluated against red rot (Cf 07 and Cf 08) by plug method of inoculation (Table-2).

Red rot:

In Initial Varietal Trial (Early), all the genotypes except CoLk 12207 were moderately resistant (MR) by plug method and resistant (R) by nodal method to Cf 07 and Cf 08. CoLk 12207 was highly susceptible (HS) by plug method whereas susceptible (S) by nodal method to both the pathotypes.

In Advanced Varietal Trial (Early)-I Plant, all the genotypes except CoP 11436 were moderately resistant (MR) by plug method and resistant (R) by nodal method whereas CoP 11436 was moderately susceptible (MS) by plug method and moderately resistant by nodal method against Cf 07. CoP 11436 was susceptible (S); CoP 11437 was moderately resistant (MR); CoP 11438 was moderately susceptible (MS) and CoSe 11451 was susceptible (S) by plug method against Cf 08. Whereas CoP 11436, CoP 11438 and CoSe 11451 were moderately susceptible (MS) and CoP 11437 was resistant (R) against Cf 08 by nodal method.

In Initial varietal Trial (Mid late), all the genotypes except CoLk 09204 were moderately resistant (MR) by plug method and resistant (R) by nodal method against both the pathotypes. CoLk 09204 was found moderately susceptible (MS) by plug method and moderately resistant (MR) by nodal method to Cf 07 whereas moderately resistant (MR) by both the method of inoculation to Cf 08.

In Advanced Varietal Trial (Mid late)-I Plant, all the four genotypes *viz.*, BO 155, CoSe 11453, CoSe 11454 and CoSe 11455 were moderately resistant (MR) by plug method and resistant (R) by nodal method to both the test pathotypes.

In Advanced Varietal Trial (Mid late)-II Plant, all the three genotypes *viz.*, CoSe 10451, CoSe 10452 and CoSe 10453 were moderately resistant (MR) by plug method and resistant (R) by nodal method against both the test pathotypes.

Among the Standard checks i.e. BO 91 was moderately susceptible (MS) to both the pathotypes. CoSe 92423 and CoSe 95422 were moderately susceptible (MS) to pathotype Cf 07 whereas susceptible (S) to pathotype Cf 08. CoP 9301 was found moderately resistant (MR) to both the test pathotypes.

Table-2: Reaction of sugarcane genotypes against red rot at IISR Regional Centre, Motipur

Sl. No.	Genotype	Red Rot (Plug method)		Red Rot (Nodal method)	
		Cf 07	Cf 08	Cf 07	Cf 08
Initial Varietal Trial (Early)					
1.	CoLk 12207	HS	HS	S	S
2.	CoLk 12208	MR	MR	R	R
3.	CoP 12436	MR	MR	R	R
4.	CoP 12437	MR	MR	R	R
Advanced Varietal Trial (Early)-I Plant					
1.	CoP 11436	MS	S	MR	MS
2.	CoP 11437	MR	MR	R	R
3.	CoP 11438	MR	MS	R	MS
4.	CoSe 11451	MR	S	R	MS
Initial Varietal Trial (Mid late)					
1.	CoLk 09204	MS	MR	MR	MR
2.	CoLk 12209	MR	MR	R	R
3.	CoP 12438	MR	MR	R	R
4.	CoP 12439	MR	MR	R	R
5.	CoSe 12452	MR	MR	R	R
6.	CoSe 12453	MR	MR	R	R
Advanced Varietal Trial (Mid late)-I Plant					
1.	BO 155	MR	MR	R	R
2.	CoSe 11453	MR	MR	R	R
3.	CoSe 11454	MR	MR	R	R
4.	CoSe 11455	MR	MR	R	R
Advanced Varietal Trial (Mid late)-II Plant					
1.	CoSe 10451	MR	MR	R	R
2.	CoSe 10452	MR	MR	R	R
3.	CoSe 10453	MR	MR	R	R
Standard Checks					
1.	BO 91	MS	MS	-	-
2.	CoP 9301	MR	MR	-	-
3.	CoSe 92423	MS	S	-	-
4.	CoSe 95422	MS	S	-	-
5.	CoJ 64*	HS	HS	-	-

*: Check for red rot

PP 22: Survey of sugarcane diseases naturally occurring in the area on important varieties

A survey was conducted for occurrence of sugarcane diseases on commercially cultivated varieties in different cane growing area of Uttar Pradesh (Command area of DSCL group, Balrampur Chini Mill Group, Bajaj Hindusthan Group and Seksaria Biswan Chini Mill, Biswan). In the disease survey, incidence of red rot was noticed in CoLk 8102, CoS 8436, CoS 91269 and CoJ 85. Localized incidence of red rot was also noticed in the two popular early sugarcane varieties *viz.*, Co 0238 (at Biswan) and CoLk 94184 (at Gularia). In general, incidence of red rot was low (2-5 %). However, in some fields of CoLk 8102 and CoS 8436, the incidence was to tune of 20 per cent. Incidence of smut was observe in CoSe 92423 and Co 0238. Incidence of GSD was noticed in most of the field surveyed (1-2 %). In some locations, higher incidence of GSD was noticed in CoS 91269 (5-10 %). The incidence of the minor diseases like Pokkah boeng is increasing substantially and it is mostly affecting the early sugarcane variety Co 0238. In some fields Pokkah boeng incidence was noticed more than 30 per cent. Stray incidence of leaf scald was also observed in Co 0238.

In Bihar red rot was recorded in varieties namely BO 130 and CoSe 95422 under Hari Nagar and Hasanpur Chini Mill command areas to the tune of 2-4 %. Whereas Pokkah Boeng was observed in the variety Co 0238 and Yellow Leaf Disease (YLD) was noticed in the varieties CoLk 94184 and Co 0238.