

**ALL INDIA CO-ORDINATED RESEARCH  
PROJECT ON SUGARCANE (ICAR)**



**ANNUAL REPORT (Plant Pathology)  
2014-2015**

**Sugarcane Pathology Section  
PAU Regional Research Station  
Kapurthala-144601**

To

Dr O. K. Sinha  
Project Coordinator of AICRP on sugarcane  
Indian Institute of Sugarcane Research  
Lucknow-226 002

Memo No: 3216-17

Dated: 12-06-2015

**Subject: Annual report of AICRP on Sugarcane (Pathology) for the year 2014-15  
Kapurthala (PAU, Ludhiana)**

Sir

Please find enclosed herewith two copies of Annual report of trials conducted on **Sugarcane Pathology** under AICRP at Punjab Agricultural University, Regional Research Station, Kapurthala during crop season of **2014-15**. This is for your kind information and further necessary action.

With regards

(Bipen Kumar) Sr. Plant Pathologist  
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Sugarcane Pathology Section,  
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CC:

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**TECHNICAL REPORT OF ALL INDIA CO-ORDINATED RESEARCH PROJECT  
ON SUGARCANE: PATHOLOGY SECTION (2014-15)**

(Sugarcane Pathology Section, PAU Regional Research Station, Kapurthala)

<b>Project No</b>	<b>: PP-14</b>
Location	: PAU Regional Research Station, Kapurthala
Title	: Identification of pathotypes/races in red rot pathogen
Objectives	: To gather information on the major pathotypes of red rot
Year of experiment	: 30 <sup>th</sup> (Year of start 1984-85)
Technical Programme	: A given set of differentials to be inoculated by plug method with different local isolates of red rot pathogen and observations to be recorded on disease development after sixty days.
Technical programme for the next year	: To continue with recently collected red rot isolates

**Technical Report:**

Fourteen differentials were inoculated by plug method on 25.08.2014 using conidial suspension separately from each of 11 red rot pathotypes / isolates (7 pathotypes and 4 new isolates) collected from Punjab state. The seven pathotypes were CF 01 from Co 1148, CF 02 from Co 7717, CF 03 from CoJ 64, CF 07 from CoJ 64, CF 08 from CoJ 84, CF 09 from CoS 767 and CF 11 from CoJ 64 and the newly collected 4 isolates were RI-295 from CoPb 91 Phagwara sugar mill area, RI-296 from CoS 8436 Dhuri sugar mills area, RI-297 from CoJ 85 Gurdaspur mill area and RI-298 from CoJ 88 from Phagwara mill area. Observations on disease development as per technical programme were recorded 60 days after inoculations and host reaction was categorized into three groups viz., Resistant (R), Intermediate (X) and Susceptible (S).

The perusal of data contained in Table PP-I revealed that all the isolates/ pathotypes were avirulent only on SES 594 and virulent on Co 997 and Khakai. A new pathotype CF 11 from CoJ 64 tested first time at this station showed intermediate reaction (X) on BO 91 and Baragua whereas other tested pathotypes & isolates are resistant on these. A new isolate

RI-295 from CoPb 91 (Mid maturing variety) quite similar to pathotype CF 08 except it showed intermediate reaction on Co 1148. An isolate RI-297 from CoJ 85 showed similar reaction as pathotype CF 08. Similarly an isolate from CoS 8436 namely RI-296 also found as virulent as pathotype CF 08 except it showed susceptible (S) reaction on CoS 8436 and resistant (R) reaction on Co 1148. An isolate RI-298 from CoJ 88 also showed susceptible (S) reaction on 8 differentials, intermediate on 2 and resistant reaction on 4 differentials. It is more virulent than pathotype CF 09 from CoS 767. We can say new isolates RI-296 and RI-297 are quite virulent as pathotype CF 08. These isolates will be submitted to IISR Lucknow for testing in all AICRP centres in North West Zone. Two new isolates RI-295 from CoPb 91 and RI-298 from CoJ 88 will be tested at this centre during 2015-16 for further confirmation.

### **Summary**

Newly collected isolates RI-296 from CoS 8436 Dhuri mill area and RI-297 from CoJ 85 from Gurdaspur mill area are found as virulent as pathotype CF 08 from CoJ 84. Other two new isolates i.e., RI-295 from CoPb 91 and RI-298 from CoJ 88 will be tested during 2015-16 at this station for further confirmation.

**Project No** : **PP-17**  
**Location** : PAU Regional Research Station, Kapurthala  
**Title** Evaluation of pre-zonal /zonal varieties/genotypes for resistance to red rot, smut and wilt  
**Objectives** a) To gather information on the relative resistance to red rot of the entries in the pre zonal/zonal varieties  
**Year of experiment** : 28<sup>th</sup> ( year of start 1986-87)  
**Technical Programme** Early and Mid-Late genotypes/varieties to be evaluated against red rot both by the plug and cotton swab with pathotypes CF 08 and CF 09 separately  
**Technical programme for the next year** : To Continue with new entries

### **Technical Report:**

#### **A: Red Rot**

The material provided by Sugarcane Breeding Section was inoculated by plug and cotton swab methods on 25/08/2014 using a conidial suspension of two red rot pathotypes separately viz., CF 08 from CoJ 84 and CF 09 from CoS 767. In cotton swab method two canes in each

of the twenty clumps were inoculated by removing the lower most green leaf sheath and immediately placing the cotton swab (dipped in freshly prepared inoculum suspension) around the cane covering nodal region. The cotton swab was held in place by wrapping the parafilm over the swab. Observations on disease development were recorded up to 60 days of inoculations and varieties were categorized on 0-9 scale.

#### **AVT (Early) plant 1**

Three genotypes along with two checks CoJ 64 and Co Pant 84211 were evaluated against pathotype CF 08 and CF 09 separately. Two entries namely Co 10035 and CoS 10231 behaved as MR/ R by plug and cotton swab methods by both the pathotypes separately (Table PP 2) and one entry CoH 10261 showed MS and MR with CF 08 and CF 09 respectively by plug method and R by cotton swab method. The checks behaved as HS/S.

#### **AVT (Early) Plant II**

Five genotypes along with two checks CoJ 64 and Co Pant 84211 were evaluated against pathotype CF 08 and CF 09 separately. Two entries CoLk 09202 and CoS 09246 behaved as MR/ R by plug and cotton swab methods by both the pathotypes separately (Table PP 2) while three entries CoH 09262, CoH 09263 and CoPb 09181 showed MS and MR with CF 08 and CF 09 respectively by plug method and R by cotton swab method except CoPb 09181 which showed S with CF 08 pathotype by cotton swab method. The two checks behaved as HS/ S.

#### **AVT (Mid late) Plant I**

Five entries along with 3 checks CoS 767, CoS 8436 and Co Pant 97222 were tested against pathotype CF 08 and CF 09 separately. Four entries namely CoH 10262, CoPant 10221, CoPb 10181 and CoPb 10182 and a check CoS 8436 behaved as MR/R by plug and cotton swab methods by both the pathotypes separately (Table PP 2) while one genotype Co 10036 showed MS and MR with CF 08 and CF 09 respectively by plug method and R by cotton swab method. Check variety CoPant 97222 behaved as MS/ S whereas CoS 767 behaved as S/HS with CF 08/CF 09 respectively by plug method and susceptible (S) by cotton swab method.

#### **AVT (Mid late) Plant II**

Five genotypes along with three checks checks CoS 767, CoS 8436 and Co 1148 were evaluated against pathotype CF 08 and CF 09 separately. Two genotypes viz; Co 09022, CoS 09232 and a check CoS 8436 were found MR/R by plug and cotton swab method with both the pathotypes. Three genotype namely CoH 09264, CoLk 09204 and CoPb 09214 showed MS and MR with CF 08 and CF 09 respectively by plug method and R by cotton swab

method. Check variety CoPant 97222 behaved as MS/ S whereas CoS 767 behaved as S with CF 08 and HS/S with CF 09 by both the methods.

#### **IVT (Early)**

Seven genotypes along with two checks CoJ 64 and Co Pant 84211 were evaluated against pathotype CF 08 and CF 09 separately. Three genotypes i.e., CoH 11262, CoLk 11202 and CoPb 11212 were found MR/R to both the pathotypes with plug and cotton swab methods. Genotype CoLk 11201 and CoLk 11203 were found MS and MR with CF 08 and CF 09 respectively by plug method and R by cotton swab method while CoPb 11211 showed MR and MS with CF 08 and CF 09 respectively by plug method and R by cotton swab method. One entry CoH 11261 showed HS/ MS with CF 08 and CF 09 pathotypes by plug method and S/ S by cotton swab method.

#### **IVT (Mid late)**

Thirteen genotypes along with three checks CoS 767, CoS 8436 and CoPant 97222 were evaluated against pathotypes CF 08 and CF 09 individually. Nine genotypes namely; Co 11026, Co 11027, CoH 11263, CoH 11264, CoLk 11204, CoLk 11205, CoLk 11206, CoPb 11181, CoPb 11213 and check CoS 8436 were found MR/R by plug and cotton swab method by both the pathotypes. Two genotypes CoS 11231 and CoS 11232 were found MR/R with CF 08 and MS/R with CF 09 by plug and cotton swab method while genotype CoPb 11182 was found MS/R with CF 08 and CF 09 by both the methods. One genotype CoPb 11214 showed MS/R with CF 08 and MR/ R with CF 09 by plug method and cotton swab method. Check variety CoPant 97222 showed MS/S reaction on both the pathotypes while check CoS 767 showed S/HS with CF 08/ CF 09 respectively by plug and cotton swab method.

#### **Summary**

Thirty eight genotypes tested against red rot pathotypes CF 08 and CF 09 separately by plug and cotton swab methods. In AVT (Early) Plant I, two entries namely Co 10035 and CoS 10231 behaved as MR/ R by plug and cotton swab methods by both the pathotypes separately. In AVT (Early) Plant II, two entries CoLk 09202 and CoS 09246 behaved as MR/ R by plug and cotton swab methods by both the pathotypes separately. In AVT (Mid late) Plant I, four entries namely CoH 10262, CoPant 10221, CoPb 10181 and CoPb 10182 and a check CoS 8436 behaved as MR/R by plug and cotton swab methods by both the pathotypes separately. In AVT (Mid late) Plant II, two genotypes viz; Co 09022, CoS 09232 and a check CoS 8436 were found MR/R by plug and cotton swab method with both the pathotypes. Three genotype namely CoH 09264, CoLk 09204 and CoPb 09214 showed MS and MR with CF 08 and CF 09 respectively by plug method and R by cotton swab method. In IVT (Early),

three genotypes i.e., CoH 11262, CoLk 11202 and CoPb 11212 were found MR/R to both the pathotypes with plug and cotton swab methods and in IVT (Mid late), nine genotypes namely; Co 11026, Co 11027, CoH 11263, CoH 11264, CoLk 11204, CoLk 11205, CoLk 11206, CoPb 11181, CoPb 11213 and check CoS 8436 were found MR/R by plug and cotton swab method by both the pathotypes.

**Objectives** b) To gather information on the relative resistance to smut of the entries in the pre zonal/zonal varieties

**Year of experiment** : 19<sup>th</sup> ( year of start 1995-96)

**Technical Programme** Genotypes to be evaluated against smut ( *Ustilago scitaminea*) by steeping of setts (3-budded) for 30 minutes in a mixed spore suspension . Observations to be recorded at weekly intervals and genotypes rated on cumulative percent disease incidence.

**Technical programme for the next year** : To continue with new entries

### **Technical Report:**

#### **Smut**

Thirty eight genotypes and 6 pathological standards (Co 740, Co 1158, Co 7915, Co 62175, NCO 310, Katha) evaluated against smut by steeping method. Observation on disease appearance was recorded at weekly intervals throughout the crop season and simultaneously rouging out of smutted clumps each time to avoid secondary spread of the disease. The genotypes were categorized based on cumulative percent smut incidence.

Out of 38 genotypes, seventeen genotypes namely Co 10035, CoH 10261, Co 10036, CoH 10262, CoPant 10221, CoPb 10181, CoS 09232, CoH 11262, CoPb 11212, Co 11026, CoH 11263, CoLk 11204, CoLk 11206, CoPb 11181, CoPb 11182, CoPb 11214 and CoS 11231 were rated as moderately resistance (MR) (Table PP-3). Of the remaining 21 entries, 20 were rated as moderately susceptible (MS), one entry CoH 09263 was rated as susceptible (S). Among six pathological standards, five (740, Co 1158, Co 62175, NCO 310 and Katha) were found highly susceptible (HS) and Co 7915 as moderately resistant (MR).

#### **Summary**

Out of 38 genotypes, 17 genotypes namely Co 10035, CoH 10261, Co 10036, CoH 10262, CoPant 10221, CoPb 10181, CoS 09232, CoH 11262, CoPb 11212, Co 11026, CoH 11263,

CoLk 11204, CoLk 11206, CoPb 11181, CoPb 11182, CoPb 11214 and CoS 11231 were rated as moderately resistance (MR), 20 were rated as moderately susceptible (MS), one entry CoH 09263 was rated as susceptible (S) and out of 6 pathological standards, five (740, Co 1158, Co 62175, NCO 310 and Katha) were found highly susceptible (HS) and Co 7915 as moderately resistant (MR).

<b>Objectives</b>	c) To gather information on the relative resistance to wilt of the entries in the pre zonal/zonal varieties
<b>Year of experiment</b>	: 14 <sup>th</sup> ( year of start 2000-01)
<b>Technical Programme</b>	Genotypes to be evaluated against wilt by planting in soil mass inoculated with <i>Fusarium sacchari</i> culture
<b>Technical programme for the next year</b>	: To Continue with new entries

### **Technical Report:**

#### **Wilt**

Thirty eight entries with two standards Co 7717 and Co 89003 were evaluated for wilt at PAU Regional Research Station, Kaputhala. The inoculum mixture of *Fusarium sacchari* (@100 g/meter row) is applied over the setts uniformly in the furrows at the time of planting. Germination count was taken after 45 days. The symptoms on the standing canes were recorded after 10 months of planting. The mean wilt severity index was worked out based on the number of canes sampled.

Out of 38 genotypes 26 behaved as R (grade 0), 8 genotypes namely Co 10035, CoH 09262, CoS 09246, Co 10036, CoH 11261, CoH 11263, CoLk 11205 and CoPb 11182 as MR (grade 1), 4 genotypes viz; CoH 09263, CoPb 09181, CoLk 09204 and CoH 11262 as MS (grade 2) and 2 standards viz; Co 07717 and Co 89003 as HS (grade 4) given in Table PP-4.

#### **Summary**

Out of 38 genotypes, 26 were resistant to wilt, 8 were moderately resistant and 4 were moderately susceptible. Check varieties namely Co 7717 and Co 89003 were found highly susceptible to wilt only. Germination count recorded after 45 days of sowing showed no significant changes among the entries resistant and susceptible for wilt disease.



**Project No** : **PP-22**  
**Location** : PAU Regional Research Station, Kapurthala  
**Title** Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties  
**Objectives** To gather information on the diseases naturally occurring in the area on released varieties.  
**Year of experiment** : 25<sup>th</sup> ( year of start 1989-90)

The disease survey on sugarcane crop was conducted in 9 Cooperative sugar mills viz., Bhogpur, Budhewal, Batala, Gurdaspur, Nawan Shahar, Ajnala, Morinda, Nakodar and Fazilka and 7 private mill areas three times during June, September and November. Recommended varieties CoJ 83, CoH-119 and CoJ 89 were found free from red rot disease in all mills areas. Red rot was observed on ratoon as well as plant crop CoS 8436 with an incidence (traces to 8.0 per cent) in Dhuri, Amloh, Budhewal and Morinda mills area and in traces on varieties CoJ 64, CoJ 85, CoJ 88 and CoPb 91 in Gurdaspur, Phagwara ButtarSevian, Nawanshahr and Budhewal mills areas. Varieties Co 89003, CoJ 88 and Co 238 were found infected with smut in traces in Batala, Phagwara and Morinda mills area. Wilt incidence of 8-10% was observed on Co 89003 in Dhuri, Amloh, ButtarSevian, Gurdaspur, Batala and Ajnala mills area. Pokkah Boeng disease was observed on variety Co 238 (traces) in Amloh, Dhuri, Batala, Gurdaspur, Budhewal, Bhogpur, Phagwara and Dasuya Sugarmill areas. Red stripe/top rot disease was observed (2-4 %) on CoJ 85 in Batala, Gurdaspur, Ajnala, Nakodar, Bhogpur and Mukerian sugar mills area (Table PP-5).

**Project No** : **PP-23**  
**Location** : PAU Regional Research Station, Kapurthala  
**Title** Assessment of ISH genotypes for resistance to red rot  
**Objectives** To gather information on the *Saccharum* spp. and elite genotypes for resistance to red rot so that the resistant genotypes could be used in breeding programme as possible donars for resistance.

**Technical Report:**

Forty three ISH genotypes were inoculated by plug method on 27. 08. 2014 using red rot pathotypes CF 08 from CoJ 84 and CF 09 from CoS 767. Observations on disease development were recorded after 60 days of inoculations and genotypes were rated on 0-9 scale.

Of the 43 genotypes, none behaved as Resistant, fourteen genotypes namely ISH 01, 07, 108, 113, 118, 119, 135, 148, 203, 211, 264, 269, 277 and ISH 286 were found MR, one genotype ISH 115 was found MS, one ISH 31 was susceptible and 8 were HS to both the pathotypes by plug method of inoculation (Table PP-6). Four genotypes namely ISH 105, ISH 144, ISH 185 and ISH 313 were found MR to CF 08 and HS to CF 09 whereas two genotypes ISH 12 and ISH 284 were HS to CF 08 and MR to CF 09. Three genotypes ISH 49, ISH 191 and ISH 224 were found MS to CF 08 and MR to Cf 09 whereas ISH 260 was MR to CF 08 and MS to CF 09. Three ISH entries ISH 281, ISH 309 and ISH 314 were MS to CF 08 and HS to CF 09 where as genotype ISH 193 was MS/S to CF 08/ CF 09. Eight ISH entries ISH 34, ISH 88, ISH 114, ISH 187, ISH 265, ISH 267, ISH 273 and ISH 308 were HS to both CF 08 and CF 09 pathotypes.

**Summary**

Of the 43 genotypes, none behaved as Resistant, fourteen genotypes namely ISH 01, 07, 108, 113, 118, 119, 135, 148, 203, 211, 264, 269, 277 and ISH 286 were found MR, one genotype ISH 115 was found MS, one ISH 31 was S and 8 were HS to both the pathotypes by plug method of inoculation.

**Table PP-1: Pathogenic behavior of isolates of *Colletotrichum falcatum* on host differentials- Kapurthala (PAU)**

Sr No	Pathotypes/ 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	BO 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	S	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 84	S	S	S	S	S	S	S	S	R	R	R	R	S	R
6	CF-09	CoS 767	X	X	S	S	R	R	S	S	S	R	R	R	S	R
7	CF-11	CoJ 64	S	X	S	X	X	X	X	S	X	R	X	X	S	R
8	RI- 295	CoPb 91	S	S	S	X	S	S	S	S	R	R	R	R	S	R
9	RI- 296	CoS 8436	S	S	S	R	S	S	S	S	R	S	R	R	S	R
10	RI- 297	CoJ 85	S	S	S	S	S	S	S	S	R	R	R	R	S	R
11	RI-298	CoJ 88	X	S	S	S	S	S	S	S	R	R	R	R	S	R

Reaction\*    R = Resistant;                    X = Intermediate;                    S = Susceptible

Date of inoculation: 25.08.2014

Date of observations: 26.10.2014

**Table PP- 2: Evaluation of AVT/IVT sugarcane genotypes for red rot resistance- Kapurthala (PAU)**

S. No	Genotypes	Plug method				Cotton swab method	
		CF 08		CF 09		CF-08	CF 09
		S*	R**	S**	R**	R**	R**
<b>AVT (Early) Plant I</b>							
1	Co 10035	3.4	MR	3.0	MR	R	R
2	CoH 10261	4.9	MS	3.2	MR	R	R
3	CoS 10231	3.3	MR	4.4	MS	R	R
4	CoJ 64	8.4	HS	8.2	HS	S	S
5	Co Pant 84211	6.2	S	8.1	HS	S	S
<b>AVT (Early) Plant II</b>							
1	CoH 09262	4.0	MS	3.5	MR	R	R
2	CoH 09263	4.4	MS	3.4	MR	R	R
3	CoLk 09202	3.8	MR	3.3	MR	R	R
4	CoPb 09181	5.6	MS	3.4	MR	S	R
5	CoS 09246	3.4	MR	3.0	MR	R	R
6	CoJ 64	8.4	HS	8.2	HS	S	S
7	CoPant 84211	6.2	S	8.1	HS	S	S
<b>AVT (Mid Late) Plant I</b>							
1	Co 10036	4.2	MS	3.2	MR	R	R
2	CoH 10262	3.8	MR	3.2	MR	R	R
3	CoPant 10221	3.1	MR	3.5	MR	R	R
4	CoPb 10181	3.4	MR	3.8	MR	R	R
5	CoPb 10182	3.6	MR	3.2	MR	R	R
6	CoS 767	7.2	S	8.4	HS	S	S
7	CoS 8436	3.4	MR	3.1	MR	R	R
8	CoPant 97222	5.7	MS	5.4	MS	S	S
<b>AVT (Mid Late) Plant II</b>							
1	Co 09022	3.8	MR	4.6	MS	R	R
2	CoH 09264	4.0	MS	3.2	MR	R	R
3	CoLk 09204	4.0	MS	3.4	MR	R	R
4	CoPb 09214	5.7	MS	3.0	MR	R	R
5	CoS 09232	3.9	MR	3.2	MR	R	R
6	CoS 767	7.2	S	8.4	HS	S	S
7	CoS 8436	3.4	MR	3.1	MR	R	R
8	CoPant 97222	5.7	MS	5.4	MS	S	S
<b>IVT (Early)</b>							
1	CoH 11261	8.4	HS	5.8	MS	S	S
2	CoH 11262	3.2	MR	3.4	MR	R	R
3	CoLk 11201	4.8	MS	3.7	MR	R	R
4	CoLk 11202	3.4	MR	3.8	MR	R	R
5	CoLk 11203	4.2	MS	3.2	MR	R	R

6	CoPb 11211	3.9	MR	4.4	MS	R	R
7	CoPb 11212	3.6	MR	3.3	MR	R	R
8	CoJ 64	8.6	HS	8.3	HS	S	S
9	Co 238	4.2	MS	4.4	MS	R	R
<b>IVT (Midlate)</b>							
1	Co 11026	3.2	MR	3.4	MR	R	R
2	Co 11027	3.4	MR	3.2	MR	R	R
3	CoH 11263	3.4	MR	3.6	MR	R	R
4	CoH 11264	3.9	MR	3.6	MR	R	R
5	CoLk 11204	3.5	MR	3.2	MR	R	R
6	CoLk 11205	3.4	MR	3.5	MR	R	R
7	CoLk 11206	3.8	MR	3.2	MR	R	R
8	CoPb 11181	3.6	MR	3.3	MR	R	R
9	CoPb 11182	4.4	MS	4.7	MS	R	R
10	CoPb 11213	3.4	MR	3.3	MR	R	R
11	CoPb 11214	4.6	MS	3.2	MR	R	R
12	CoS 11231	3.5	MR	3.3	MS	R	R
13	CoS 11232	3.7	MR	3.0	MS	R	R
14	CoS 767	7.1	S	8.3	HS	S	S
15	CoS 8436	3.5	MR	3.2	MR	R	R
16	CoPant 97222	5.5	MS	5.3	MS	S	S
					<b>*Score</b>	<b>** Reaction</b>	
<b>Date of inoculation</b> : 25.08.2014					0-2	R (Resistant)	
<b>Date of Observation:</b> 26.10.2014					2.1-4	MR (Moderately Resistant)	
<b>Pathotypes/Isolates used:-</b>					4.1-6	MS (Moderately Susceptible)	
CF-08 from CoJ 84					6.1-8	S (Susceptible)	
CF-09 from CoS 767					> 8	HS (Highly Susceptible)	

**Table PP- 3: Evaluation of sugarcane genotypes for smut resistance- Kapurthala (PAU)**

S.No.	Genotypes	Score	Reaction	S.No.	Genotypes	Score	Reaction
<b>AVT (Early) Plant I</b>				<b>IVT (Early)</b>			
1	Co 10035	8.5	MR	1	CoH 11261	14.0	MS
2	CoH 10261	8.0	MR	2	CoH 11262	8.0	MR
3	CoS 10231	15.0	MS	3	CoLk 11201	12.5	MS
4	CoJ 64	25.5	S	4	CoLk 11202	10.5	MS
5	CoPant 84211	26.0	S	5	CoLk 11203	11.0	MS
<b>AVT (Early) Plant II</b>				6	CoPb 11211	10.5	MS
				7	CoPb 11212	9.2	MR
1	CoH 09262	18.5	MS	8	CoJ 64	25.5	S
2	CoH 09263	24.5	S	9	CoPant 84211	26.0	S
3	CoLk 09202	14.5	MS	<b>IVT (Midlate)</b>			
4	CoPb 09181	14.0	MS	1	Co 11026	8.0	MR
5	CoS 09246	16.0	MS	2	Co 11027	12.0	MS
6	CoJ 64	25.5	S	3	CoH 11263	10.0	MR
7	CoPant 84211	26.0	S	4	CoH 11264	12.5	MS
<b>AVT (Mid Late) Plant I</b>				5	CoLk 11204	10.0	MR
				6	CoLk 11205	13.5	MS
1	Co 10036	8.0	MR	7	CoLk 11206	11.5	MS
2	CoH 10262	9.0	MR	8	CoPb 11181	10.0	MR
3	CoPant 10221	8.5	MR	9	CoPb 11182	8.0	MR
4	CoPb 10181	8.0	MR	10	CoPb 11213	11.0	MS
5	CoPb 10182	15.5	MS	11	CoPb 11214	8.5	MR
6	CoS 767	23.0	S	12	CoS 11231	9.0	MR
7	CoS 8436	15.5	MS	13	CoS 11232	13.0	MS
8	CoPant 97222	16.0	MS	14	CoS 767	23.0	S
<b>AVT (Mid Late) Plant II</b>				15	CoS 8436	15.5	MS
				16	CoPant 97222	16.0	MS
1	Co 09022	17.0	MS	<b>Standards</b>			
2	CoH 09264	13.0	MS	1	Co 740	33.0	HS
3	CoLk 09204	16.0	MS	2	Co 1158	34.0	HS
4	CoPb 09214	15.5	MS	3	Co 7915	9.5	MR
5	CoS 09232	9.0	MR	4	Co 62175	32.0	HS
6	CoS 767	23.0	S	5	NCO 310	35.5	HS
7	CoS 8436	15.5	MS	6	Katha	34.5	HS
8	CoPant 97222	16.0	MS	Disease incidence Nil		=	R (Resistant)
				Disease incidence 0.1-10%		=	MR( Moderate Resistant)
				Disease incidence 10.1% - 20%		=	MS (Moderate Susceptible)
				Disease incidence 20.1- 30%		=	S (Susceptible)
				Disease incidence > 30 %		=	HS ( Highly susceptible)

**Table PP-4: Evaluation of sugarcane genotypes for wilt resistance- Kapurthala (PAU)**

S.No.	Genotypes	Germination % at 45 days	Score	Reaction
1	Co 10035	42	1.0	MR
2	CoH 10261	46	0.0	R
3	CoS 10231	48	0.0	R
4	CoH 09262	45	1.0	MR
5	CoH 09263	44	2.0	MS
6	CoLk 09202	42	0.0	R
7	CoPb 09181	41	2.0	MS
8	CoS 09246	42	1.0	MR
9	Co 10036	44	1.0	MR
10	CoH 10262	42	0.0	R
11	CoPant 10221	40	0.0	R
12	CoPb 10181	43	0.0	R
13	CoPb 10182	43	0.0	R
14	Co 09022	40	0.0	R
15	CoH 09264	42	0.0	R
16	CoLk 09204	42	2.0	MS
17	CoPb 09214	44	0.0	R
18	CoS 09232	43	0.0	R
19	CoH 11261	43	1.0	MR
20	CoH 11262	40	2.0	MS
21	CoLk 11201	46	0.0	R
22	CoLk 11202	43	0.0	R
23	CoLk 11203	37	0.0	R
24	CoPb 11211	41	0.0	R
25	CoPb 11212	48	0.0	R
26	Co 11026	42	0.0	R
27	Co 11027	39	0.0	R
28	CoH 11263	38	1.0	MR
29	CoH 11264	36	0.0	R
30	CoLk 11204	44	0.0	R
31	CoLk 11205	37	1.0	MR
32	CoLk 11206	36	0.0	R
33	CoPb 11181	39	0.0	R
34	CoPb 11182	42	1.0	MR
35	CoPb 11213	45	0.0	R
36	CoPb 11214	40	0.0	R
37	CoS 11231	43	0.0	R
38	CoS 11232	39	0.0	R
<b>Standards</b>				
1	Co 7717	44	4.0	HS
2	Co 89003	45	4.0	HS
<b>Evaluation: 0-4 Scale of wilt severity index</b>				

**PP 5: Survey of sugarcane diseases naturally occurring in the Punjab State on important sugarcane varieties.**

<b>Name of disease</b>	<b>Location</b>	<b>Disease incidence</b>	<b>Varieties affected</b>	<b>Crop stage when observed</b>
Red rot	Dhuri, Amlloh, ButtarSevian, Morinda, Gurdaspur, Nawanshahr, Budhewal, Phagwara	Traces to 8.0%	CoS 8436, CoJ 64, CoJ 85, Co 88, CoPb 91	5 Months (July)
Wilt	Dhuri, Amlloh, Buttar Sevian, Gurdaspur, Batala, Ajanala	8-10 %	Co 89003	9 Months (November)
Smut	Batala, Phagwara, Morinda	Traces	Co 89003 CoJ 88 Co 238	3 Months (May) 8 Months (October)
Bacterial red stripe disease/ top rot.	Ajanala, Batala, Gurdaspur, Nakodar, Bhogpur, Mukerian	2-4 %	CoJ 85	5 Months (July)
Pokkah Boeng	Amlloh, Dhuri, Gurdaspur, Batala, Budhewal, Bhogpur, Phagwara and Dasuya	Traces	Co 238	5 Months (July)



**Table PP- 6: Assessment of elite and ISH genotypes for resistance to red rot by plug method.**

Sr. No.	Variety / Treatment	CF 08		CF 09	
		Score	Reaction	Score	Reaction
1.	ISH 01	3.8	MR	3.5	MR
2.	ISH 07	3.6	MR	3.7	MR
3.	ISH 12	8.3	HS	3.4	MR
4.	ISH 31	7.5	S	7.6	S
5	ISH 34	8.0	HS	8.4	H.S
6	ISH 49	4.4	MS	3.7	MR
7	ISH 88	8.8	HS	9.0	HS
8	ISH 105	3.5	MR	8.2	HS
9	ISH 108	3.3	MR	3.8	MR
10	ISH 113	3.1	MR	3.2	MR
11	ISH 114	8.8	HS	8.4	HS
12	ISH 115	4.5	MS	4.4	MS
13	ISH 117	3.4	MR	7.2	S
14	ISH 118	3.2	MR	3.2	MR
15	ISH 119	3.3	MR	3.6	MR
16	ISH 135	3.6	MR	3.7	MR
17	ISH 137	7.5	S	3.8	MR
18	ISH 144	3.7	MR	8.4	HS
19	ISH 148	3.3	MR	3.5	MR
20	ISH 159	3.5	MR	7.5	S
21	ISH 185	3.4	MR	8.5	HS
22	ISH 187	8.2	HS	8.4	HS
23	ISH 191	4.4	MS	3.4	MR
24	ISH 193	5.7	MS	6.5	S
25	ISH 203	3.9	MR	3.2	MR
26	ISH 211	3.8	MR	3.4	MR
27	ISH 224	4.2	MS	3.4	MR
28	ISH 260	3.9	MR	3.4	MS
29	ISH 264	3.2	MR	3.1	MR
30	ISH 265	8.8	HS	8.6	HS
31	ISH 267	8.6	HS	8.5	HS
32	ISH 269	4.6	MR	3.5	MR
33	ISH 273	8.9	HS	8.8	HS
34	ISH 277	3.8	MR	3.4	MR
35	ISH 281	4.4	MS	8.5	HS
36	ISH 282	7.6	S	8.5	HS
37	ISH 284	8.6	HS	3.4	MR
38	ISH 286	3.1	MR	3.8	MR
39	ISH 287	8.6	HS	3.5	MR
40	ISH 308	8.7	HS	8.3	HS
41	ISH 309	5.8	MS	8.2	HS
42	ISH 313	3.8	MR	8.7	HS
43	ISH 314	5.4	MS	8.5	HS
Date of inoculation: 27/08/2014 Date of Observation: 28/10/2014			Pathotypes/ Isolates used CF-08 from CoJ 84, CF-09 from CoS 767		