

**Main Sugarcane Research Station**  
**Navsari Agricultural University**  
**Navsari**

**Dr. D.U. Patel**  
Research Scientist  
(Sugarcane)



Ph. No.(O) 282771 -- 282775  
Ext. 1309 (Sugarcane)  
Ph. & Fax No. (02637) 282136  
Email: sugarnau@gmail.com

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No. MSRS /H-2/ Ann.Rep.Patho./

/2014

Navsari Date: 06 /06 /2014

**To,**

Dr. R. Viswanathan,  
Head & AICRP Principal Investigator (Plant Pathology),  
Division of Crop Protection,  
Sugarcane Breeding Institute,  
**Coimbatore (Tamilnadu),**  
Pin – 641 007.

**Sub:** Submission of Annual Reports **2013-2014** of Plant Pathology.

Dear Sir,

I am submitting herewith the results of the technical programme of **Sugarcane Plant Pathology** conducted at this station during **2013-2014** (Hard & soft copy). Kindly include the same in the Annual Report and oblige.

Thanking you,

**Yours sincerely**

**Encl :** As above

(D.U. Patel)  
Research Scientist (Sugarcane)

**Copy submitted with respect to:**

- (1) The Project Coordinator, AICRP on Sugarcane, Indian Institute of Sugarcane Research, Lucknow-226 002 for information.
- (2) The Director of Research, Navsari Agricultural University, Navsari.

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**ANNUAL REPORT**  
**ALL INDIA COORDINATED RESEARCH**  
**PROJECT ON SUGARCANE**

**PLANT PATHOLOGY**

**(2013-2014)**



**MAIN SUGARCANE RESEARCH STATION**  
**NAVARI AGRICULTURAL UNIVERSITY**

**NAVARI – 396 450**



## Plant Pathology

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# PLANT PATHOLOGY

## PROJECT NO. PP 14

- 1 **Title of the experiment** : Identification of pathotypes in red rot pathogen
- 2 **Objectives** : To gather information on major pathotypes of red rot
- 3 **Year** : 2013-2014
- 4 **Centre** : Navsari
- 5 **Differentials/ Varieties** :

- |            |              |             |
|------------|--------------|-------------|
| 1. CoC 671 | 6. CoJ 64    | 11. Co 7717 |
| 2. BO 91   | 7. SES 594   | 12. CoS 767 |
| 3. Co 419  | 8. Co 62399  | 13. Co 1148 |
| 4. Co 975  | 9. Co 997    | 14. Baragua |
| 5. Khakai  | 10. CoS 8436 |             |

### 6. Inoculation

Local Gujarat isolate was used for inoculation. Freshly sporulating, 7 days old culture in petridishes was taken. The spore mass was washed with 100 ml of sterile distilled water and collected in a flask. Conidial suspension at spore strength of 1 million spores per ml of solution was prepared. Isolates chosen were only from local red rot collections.

7. **No. of isolates:** Virulent isolates selected locally of the area.

### 8. Method of inoculation

Plug method of inoculation was used (Details vide PP. 17). Inoculation with one isolate on all varieties with the same suspension. All inoculations were completed in 2 days. Inoculation was carried out by third week of August.

9. **Observation:** One observation at 60<sup>th</sup> day of inoculation.

## 10. Evaluation:

The canes split open longitudinally. Inoculated canes free from borers and other damages were taken for evaluation. Based on parameters viz. nodal transgression, lesion width, white spots, top yellowing/drying, ring infection and sporulation over the rind. Host reaction is categorized into three groups viz., Resistant (R), Susceptible (S) and Intermediate (X) as follows:

**R:** Lesion width laterally restricted, nodal transgression upto 2 nodes, white spots, rind infection, sporulation over the rind and yellowing/drying of top absent.

**S:** Lesion width laterally spreading, nodal transgression more than 2 nodes, white spots progressive or restricted, in case of progressive white spots rind infection, sporulation over the rind and yellowing/drying of top absent or present.

**I :** Lesion width laterally restricted or spreading, nodal transgression more than 2 nodes, white spots absent or present (restricted type), rind infection sporulation over the rind and yellowing/drying of tops absent.

**Note:** The various criteria are assessed in the one or two internodes above the inoculated internode. Identification of pathotypes is to be based on R and S reactions.

## 11. Results (Table.1)

At Navsari, three isolates collected from CoC 671 (Cf 06), Co 86032 (Cf 86032) and Co 94012 (Cf 94012) were inoculated on 14 recommended differentials/ varieties/ genotypes at the age of eight months. Results revealed that CoS 767, CoS 8436, BO 91, Baragua and SES 594 showed resistant reaction for all the isolates. Entry CoJ 64 showed susceptible reaction on Cf 94012 isolate but intermediate reaction on Cf 06 and Cf 86032. Entries Co 7717 and Co 62399 exhibited intermediate reaction to all the isolates. While Co 1148 showed susceptible reaction on Cf 06 and Cf 94012 but intermediate reaction on Cf 86032. Entries Co 975 and khakai gave susceptible reaction on Cf 06 and Cf 86032 but intermediate reaction on Cf 94012. Entries CoC 671, Co 419 and Co 997 showed susceptible reaction to all the isolates.

The results revealed that the pathotype Cf 06 (Navsari) and pathotype Cf 06 (Coimbatore) showed similar reaction on the differentials. Likewise pathotype Cf 06 (Navsari) revealed that Co 62399 and CoJ 64 exhibited intermediate reaction and pathotype Cf 06 (Coimbatore) revealed that Co 62399 and CoJ 64 exhibited resistant reaction.

**Table.1 Pathogenic behavior of isolates of red rot pathogen on a set of 14 differentials by plug method.**

Sr. No.	Isolates	Source	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 06 ( Navsari)	CoC 671	S	S	S	S	I	I	S	I	R	R	R	R	S	R
2.	Cf 86032	Co 86032	S	S	S	I	I	I	S	I	R	R	R	R	S	R
3.	Cf 94012	Co 94012	S	I	S	S	I	I	S	S	R	R	R	R	I	R
4.	Cf 06 (Coimbatore)	CoC 671	S	S	S	S	I	R	S	R	R	R	R	R	S	R

**R= Resistant, I = Intermediate, S=Susceptible**

**PROJECT NO. PP 17 (A)**

1. **Title of the experiment** : Evaluation of pre-zonal /IVT/zonal varieties / genotypes for resistance to red rot.
2. **Objectives** : To gather information on the relative resistance to red rot of the entries in pre zonal varietal trial / zonal varietal trials of the respective zones.
3. **Location** : Navsari **Zone** : Peninsular
4. **Year** : 2013-2014
5. **Varieties** : **54-** Zonal varieties

**6. Inoculation**

Local Gujarat isolate was used for inoculation. Freshly sporulating, 7 days old culture in petridishes was taken. The spore mass was washed with 100 ml of sterile water and collected in a flask. Conidial suspension at spore strength of 1 million spores per ml of solution was prepared. Isolate chosen was only from local red rot collection.

**7. Method of inoculation****1. Plug method**

Two canes in each of the 20 clumps to be inoculated. Inoculation is to be done in the middle of the 3<sup>rd</sup> exposed internode from bottom and two drops of the spore suspension is to be injected with a large syringe in each cane and sealed with plastic clay (plasticine) or modeling clay.

**2. Nodal cotton swab method:**

Two canes in each of 20 clumps will be inoculated by removing leaf sheath (lower most green leaf sheath) and immediately placing cotton swab (dipped in freshly prepared inoculum suspension) around the cane covering nodal region. The cotton swab should be held in place by wrapping parafilm over the swab.

## 8. Evaluation :

**1. Plug Method :** The canes to be split open longitudinally sixty days after inoculation along the point of inoculation. Inoculated canes free from borer infestation and other damages are taken for evaluation. This is graded on the international scale of 0-9 as follows :

**Variety (genotype):** ----- **Method of inoculation:** -----

No. of canes evaluated	Condition of tops*	Lesion width ** (LW)	White spot ‹ (WS)	Nodal transgression ※ (NT)	Total Score	Remarks
1.						
2. to						
15.						

\* 1. Condition of top : Green (G)-0; Yellow (Y)/Dry (D)-1.

\*\*2. Lesion width above to inoculated internode is assigned the score 1, 2 or 3

‹ 3. White spot is assigned score of 1 or 2 according to whether it is restricted or progressive.

※4. N.T. No. of nodes crossed above the inoculated internode and given the score as :

1- if one node crossed; 2-if two nodes crossed; 3. if three nodes are crossed (maximum)

Average Score = Total Score/No. of canes evaluated

**Disease reaction : 0-9 scale**

0.0 to 2 - R

2.1 to 4 – MR

4.1 to 6 – MS

6.1 to 8 – S

Above 8 – HS

**Note :** Average score is taken into account for assigning the disease reaction.

**2. Nodal Cotton Swab Method :** Remove cotton swab and scrap the node with a knife. Record presence/absence of lesions. In case lesions are progressing into stalk, the reaction is to be recorded as S (susceptible) and if no lesion development, then R (resistant).



## 9. Results : (Table 2)

### Plug Method:

At Navsari, 54 Zonal varieties/ entries from IVT (Early), IVT (Midlate), AVT (Early I & II Plant) and AVT (Midlate I & II Plant) along with susceptible check CoC 671 (Cf 06). were evaluated for resistance to red rot. Inoculation was done in the second week of August by plug as well as nodal methods using local isolates.

Out of 54 varieties of zonal trial evaluated by plug method, none of the entries exhibited resistant reaction. Twenty Nine entries viz., Co 10005, Co 10006, Co 10026, Co 10027, CoN 10071, CoN 10072 and CoT 10367 (IVT-E), Co 10015, Co 10031, Co 10033, CoM 10083, CoN 10073, CoT 10368, CoT 10369, CoVC 10061, PI 10131 and PI 10132 (IVT-ML), Co 09004, Co 09005, Co 09006, CoN 09071 and CoN 09072 (AVT-E I plant), Co 09009, Co 09012, Co 09014, CoN 09073 and CoN 09074 (AVT-ML I Plant), Co 08008 and CoSnk 08101 (AVT-ML II Plant) showed moderately resistant reaction against red rot.

Eight entries viz., Co 10004, Co 10024 and CoT 10366 (IVT-E), Co 09002, Co 09003 and Co 09007 (AVT-E I Plant), Co 08001 (AVT-E II Plant), CoSnk 05102 (AVT-ML II Plant) exhibited moderately susceptible reaction. Rest of the entries displayed susceptible to highly susceptible reaction to red rot by plug method

Two checks Co 94008 (IVT-E) and Co 99004 (IVT-ML) exhibited moderately resistant reaction. One check Co 85004 (IVT-E) showed moderately susceptible reaction. While Two checks Co 671 (IVT-E) and Co 86032 (IVT-ML) displayed highly susceptible reaction.

### Nodal Cotton Swab Method

Out of 54 varieties of zonal trial evaluated by Cotton swab method, 48 entries exhibited resistant reaction. Five entries viz., CoM 10082 (IVT-E), CoVSI 10122 (AVT-ML), VSI 08121 (AVT-E II Plant), Co 09010 and CoVSI 09121 (AVT-ML I Plant) were found moderately susceptible.

Four checks viz, Co 85004 and Co 99004 (IVT-E), Co 99004 and Co 86032 (IVT-ML) gave resistant reaction. One check CoC 671 (IVT-E) exhibited susceptible reaction.

**Table 2. PP 17(a) Evaluation of pre – zonal / IVT / Zonal varieties/ genotypes for resistance to red rot ( *Colletotrichum falcatum* ) (2013-2014)**

Sr. No.	Varieties	Plug method		Nodal cotton swab method	
		Score	Reaction	Score	Reaction
1.	2.	3.	4.	5.	6.
<b>(I)</b>	<b>Initial Varietal Trial (Early)</b>				
1.	Co 10004	5.7	MS	0.8	R
2.	Co 10005	2.9	MR	1.2	R
3.	Co 10006	3.0	MR	0.9	R
4.	Co 10024	4.3	MS	1.0	R
5.	Co 10026	2.5	MR	0.6	R
6.	Co 10027	3.0	MR	1.2	R
7.	CoM 10081	8.8	HS	1.2	R
8.	CoM 10082	8.6	HS	8.2	S
9.	CoN 10071	3.7	MR	0.8	R
10.	CoN 10072	2.6	MR	0.9	R
11.	CoT 10366	5.5	MS	1.2	R
12.	CoT 10367	2.8	MR	1.3	R
<b>Standard</b>					
1.	Co 85004	6.3	S	1.4	R
2.	Co 94008	2.4	MR	1.2	R
3.	CoC 671	9.0	HS	8.2	S
<b>(II)</b>	<b>Initial Varietal Trial (Midlate)</b>				
1.	Co 10015	2.9	MR	0.9	R
2.	Co 10031	3.0	MR	1.0	R
3.	Co 10033	2.9	MR	1.4	R
4.	CoM 10083	3.6	MR	1.3	R
5.	CoM 10084	7.2	S	1.0	R
6.	CoN 10073	3.1	MR	0.8	R

<b>8</b>					
7.	CoT 10368	2.8	MR	0.9	R
8.	CoT 10369	3.0	MR	0.7	R
9.	CoVC 10061	3.1	MR	1.0	R
10.	CoVSI 10121	8.5	HS	1.2	R
11.	CoVSI 10122	8.7	HS	8.6	S
12.	PI 10131	2.8	MR	1.2	R
13.	PI 10132	3.4	MR	1.6	R
<b>Standard</b>					
1.	Co 99004	2.7	MR	0.9	R
2.	Co 86032	8.4	HS	1.6	R
<b>(III)</b>	<b>Advanced Varietal Trial- Early I Plant</b>				
1.	Co 09002	5.1	MS	1.4	R
2.	Co 09003	4.3	MS	0.9	R
3.	Co 09004	2.4	MR	1.2	R
4.	Co 09005	3.2	MR	1.2	R
5.	Co 09006	3.6	MR	1.0	R
6.	Co 09007	5.3	MS	0.9	R
7.	CoN 09071	3.2	MR	1.2	R
8.	CoN 09072	3.0	MR	1.1	R
<b>(IV)</b>	<b>Advanced Varietal Trial- Early II Plant</b>				
1.	Co 08001	4.9	MS	1.0	R
2.	VSI 08121	8.6	HS	8.4	S
<b>(V)</b>	<b>Advanced Varietal Trial- Midlate I Plant</b>				
1.	Co 09009	2.7	MR	1.2	R
2.	Co 09010	9.0	HS	8.6	S
3.	Co 09012	3.6	MR	1.6	R
4.	Co 09013	6.7	S	1.7	R
5.	Co 09014	3.7	MR	0.8	R
6.	Co 02040	6.2	S	0.9	R

					<b>9</b>
7.	CoN 09073	3.0	MR	1.6	R
8.	CoN 09074	6.2	MR	1.5	R
9.	CoSnk 05102	3.0	MS	1.3	R
10.	CoVSI 09121	2.9	HS	8.7	S
<b>(VI)</b>	<b>Advanced Varietal Trial- Midlate II Plant</b>				
1.	Co 08008	3.0	MR	1.2	R
2.	Co 08016	6.6	S	1.3	R
3.	Co 08020	6.3	S	1.8	R
4.	CoSnk 08101	4.0	MR	0.9	R

**PROJECT NO. PP 17 (B)**

- 1. Title of the experiment** : **Evaluation of Zonal varieties for whip smut**
- 2. Objective** : To gather information on the relative resistance to smut of the entries in pre-zonal/zonal trials of the zone
- 3. Year** : 2013-2014  
**Location:** : Navsari
- 4. Varieties** : Entries of early and midlate genotypes under IVT and AVT of the zone
- 5. Plot size & planting** : One three meter row, planted with 10 three bud, setts with minimum of two replications.
- 6. Storage & Inoculation** : Freshly collected whips are dried by keeping under shade and smut teliospores are collected and filled in blotting paper bags and are stored in a desiccators under calcium chloride. Spore viability is to be examined before inoculation.  
  
The method of inoculation consists of steeping of three budded setts for 30 minutes in spore suspension of over 90 per cent viability.
- 7. Observation** : Number of clumps per row is to be recorded. Smut incidence at fortnightly interval has to be recorded up to 12 months age.
- 8. Evaluation** : Evaluation is based on percentage of clumps infected. It is required to maintain at least 15 to 20 clumps in each genotype before arriving at the percentage infection. The following grade is to be followed.
 

<b>0 per cent</b>	<b>:</b>	<b>Resistance</b>
<b>0.1 to 10 per cent</b>	<b>:</b>	<b>Moderately Resistance</b>
<b>10.1 to 20 per cent</b>	<b>:</b>	<b>Moderately Susceptible</b>
<b>21.1 to 30 per cent</b>	<b>:</b>	<b>Susceptible</b>
<b>&gt; 30 per cent</b>	<b>:</b>	<b>Highly susceptible</b>

**Results:** (Table 3)

At Navsari, 57 Zonal varieties/ entries from IVT (Early), IVT (Midlate), AVT (Early I & II Plant), AVT (Midlate I & II Plant), along with 8 checks (CoN 05071, CoC 671, Co 86032, Co 99004, CoSi 95071, Co 6806, Co 86002 and Co 94008) were evaluated for resistance to smut.

Out of 57 varieties of zonal trial evaluated for smut disease, Twenty eight entries exhibited resistant reaction viz., Co 10005, Co 10006, CoM 10081, CoN 10072 and CoT 10366 (IVT-E), CoN 10073, CoT 10368, CoT 10369, CoVC 10061 and PI 10132 (IVT-ML), Co 09003, Co 09004, Co 09005, CoN 09071 and CoN 09072 (AVT-E I Plant), Co 08001 and VSI 08121 (AVT-E II Plant), Co 09010, Co 09012, Co 09013, Co 09014, Co 02040, CoN 09073, CoN 09074 and CoSnk 05102 (AVT-ML I Plant), Co 08008, Co 08020 and CoSnk 08101 (AVT-ML II Plant) exhibited resistant reaction. Similarly eight entries viz., Co 10004 and CoT 10367 (IVT-E), CoM 10083, CoM 10084 and PI 10131 (IVT-ML), Co 09006 and Co 09007 (AVT-E I Plant), Co 09009 (AVT-ML I Plant) showed moderately resistant reaction to smut. Four entries Co 10027 and CoM 10082 (IVT-E), Co 10031 (IVT-ML), Co 08016 (AVT-ML II Plant) exhibited moderately susceptible reaction. Rest of the entries showed susceptible to highly susceptible reaction to smut. Among the eight checks three viz, CoN 05071, Co 6806 and Co 94008 gave resistant reaction, while, CoC 671 and Co 86032 exhibited moderately resistant reaction. One check viz., Co 99004 showed moderately susceptible reaction, whereas rest of 2 checks viz., CoSi 95071 and Co 86002 showed highly susceptible reaction to smut . ( Table-3).

**Table 3: Evaluation of Zonal varieties for whip smut**

S.No	Genotype	Smut incidence (%)	Reaction	S.No	Genotype	Smut incidence (%)	Reaction
<b>(I) Initial Varietal Trial (Early)</b>							
1.	Co 10004	8.00	MR	7.	CoM 10081	0.00	R
2.	Co 10005	0.00	R	8.	CoM 10082	12.5	MS
3.	Co 10006	0.00	R	9.	CoN 10071	24.5	MS
4.	Co 10024	22.5	S	10.	CoN 10072	0.00	R
5.	Co 10026	31.5	HS	11.	CoT 10366	0.00	R
6.	Co 10027	13.0	MS	12.	CoT 10367	3.00	MR
<b>(II) Initial Varietal Trial (Midlate)</b>							
1.	Co 10015	24.5	S	8.	CoT 10369	0.00	R
2.	Co 10031	14.5	MS	9.	CoVC 10061	0.00	R
3.	Co 10033	32.5	HS	10.	CoVSI 10121	38.0	HS
4.	CoM 10083	4.25	MR	11.	CoVSI 10122	36.00	HS
5.	CoM 10084	6.50	MR	12.	PI 10131	4.50	MR
6.	CoN 10073	0.00	R	13.	PI 10132	0.00	R
7.	CoT 10368	0.00	R				
<b>(III) Advanced Varietal Trial- Early I Plant</b>							
1.	Co 09002	22.5	S	5.	Co 09006	3.00	MR
2.	Co 09003	0.00	R	6.	Co 09007	4.50	MR
3.	Co 09004	0.00	R	7.	CoN 09071	0.00	R
4.	Co 09005	0.00	R	8.	CoN 09072	0.00	R
<b>(IV) Advanced Varietal Trial- Early II Plant</b>							
1.	Co 08001	0.00	R	2.	VSI 08121	0.00	R
<b>(V) Advanced Varietal Trial- Midlate I Plant</b>							
1.	Co 09009	4.50	MR	6.	Co 02040	0.00	R
2.	Co 09010	0.00	R	7.	CoN 09073	0.00	R
3.	Co 09012	0.00	R	8.	CoN 09074	0.00	R
4.	Co 09013	0.00	R	9.	CoSnk 05102	0.00	R
5.	Co 09014	0.00	R	10.	CoVSI 09121	34.5	HS

<b>(VI) Advanced Varietal Trial- Midlate II Plant</b>							
1.	Co 08008	0.00	R	3.	Co 08020	0.00	R
2.	Co 08016	12.5	MS	4.	CoSnk 08101	0.00	R
<b>Standard</b>							
1.	CoN 05071	0.00	R	4.	CoSi 95071	36.5	HS
2.	CoC 671	4.80	MR	5.	Co 6806	0.00	R
3.	Co 86032	6.50	MR	6.	Co 86002	33.0	HS
7.	Co 99004	12.0	MS	8.	Co 94008	0.00	R



**PROJECT NO. PP 17 (C)**

- 1. Title of the experiment** : Reproduction of sugarcane wilt syndrome and screening for wilt resistance.
- 2. Objective** : To study the feasibility of artificially reproducing wilt syndrome by inoculating the associated fungi and applying stress factors and use same in screening for wilt resistance.
- 3. Year** : 2013-2014  
**Location:** : Navsari
- 4. Test clones** : Entries of AVT -E I & II Plant / AVT -ML I & II Plant
- 5. Plot size & planting** : Two rows of 5 m length, planted under wilt sick plot
- 6.** : **0-4 Scale of wilt severity index :**

**Grade Symptoms**

- 0** Healthy canes and roots with no external or internal symptoms of wilt.
- 1** No wilting or drying of leaves, no stunting or shrinking of the stalk or rind, slight pith formation with yellow discolouration of the internal tissues in one or two lower internodes only. No cavity formation or fungal growth seen. Apparently normal and healthy roots.
- 2** Mild yellowing of top leaves and drying of lower leaves, mild stunting and shrinking of the stalk and rind. Yellowish discolouration of the internal tissues extends to three or four bottom internodes. Slight cavity formation of the pith, no fungal growth seen, slightly discoloured roots.
- 3** Mild yellowing of top leaves and drying of lower leaves, mild stunting and shrinking of the stalk and rind. Light brown discolouration of the internal tissues throughout the entire length of the cane except the top. Severe pith and cavity formation. Sparse fungal growth observed in the pith cavities.
- 4** Complete yellowing and death of the leaves, marked stunting, shrinking and drying of the stalk and rind, dark brown discolouration of the internal tissues extending throughout the entire length of the cane. Large pith cavities with profuse over growth of the associated fungi. Most of the roots necrotic with dark discoloration and dislodge easily from the stalks. Roots mildly discoloured and slightly necrotic.

The mean wilt severity index is worked out based on the number of canes sampled.

$$\text{Mean wilt severity index} = \frac{\text{Sum of wilt indices of individual stalks}}{\text{Number of stalks sampled}}$$

**Note:** Varieties were screened for wilt resistance in wilt sick plot.

## 7. Results

At Navsari, 29 AVT varieties including susceptible check (CoC 671) were evaluated for resistance to wilt in wilt sick plot. Out of 29 AVT varieties, none of the entries showed resistant reaction. Fifteen entries viz., Co 09002, Co 09004, Co 09005, Co 09006, Co 09007, CoN 09071 and CoN 09072 (AVT-E I Plant), Co 09009, Co 09012, Co 09014, CoN 09073 and CoN 09074 (AVT-ML I Plant), Co 08008 and Co 08020 (AVT-ML II Plant) showed moderately resistant reaction. Six entries depicted moderately susceptible reaction to wilt viz., VSI 08121 (AVT-E II Plant), Co 09003, Co 02040, CoSnk 05102 and CoVSI 09121 (AVT-ML I Plant), CoSnk 08101 (AVT-ML II Plant). Remaining entries showed susceptible reaction to wilt.

Data indicate that Three zonal checks viz Co 85004 and Co 94008 (AVT-E), Co 99004 (AVT-ML ) showed moderately resistance reaction. While Two checks CoC 671 (AVT-E) and Co 86032 (AVT-ML) exhibited susceptible reaction to wilt.

**Table 4: Evaluation of sugarcane varieties against wilt diseases in wilt sick plot at MSRS, NAU, Navsari 2013-2014**

Sr. No.	Variety	Wilt	
		Index	Reaction
<b>(I) Advanced Varietal Trial- Early I Plant</b>			
1.	Co 09002	1.8	MR
2.	Co 09003	3.1	S
3.	Co 09004	1.6	MR
4.	Co 09005	1.5	MR
5.	Co 09006	1.8	MR
6.	Co 09007	1.5	MR
7.	CoN 09071	1.4	MR
8.	CoN 09072	1.6	MR
<b>Standard</b>			
1.	Co 85004	1.9	MR
2.	Co 94008	1.4	MR
3.	CoC 671	3.7	S
<b>(II) Advanced Varietal Trial- Early II Plant</b>			
1.	Co 08001	3.3	S
2.	VSI 08121	2.9	MS
<b>Standard</b>			
1.	Co 99004	1.4	MR
2.	Co 86032	3.2	S
<b>(III) Advanced Varietal Trial- Midlate I Plant</b>			
1.	Co 09009	1.6	MR
2.	Co 09010	3.4	S
3.	Co 09012	1.6	MR
4.	Co 09013	2.3	MS
5.	Co 09014	1.7	MR
6.	Co 02040	2.1	MS
7.	CoN 09073	1.7	MR
8.	CoN 09074	1.6	MR
9.	CoSnk 05102	2.4	MS
10.	CoVSI 09121	2.6	MS

(IV)	Advanced Varietal Trial- Midlate II Plant		
1.	Co 08008	1.5	MR
2.	Co 08016	3.4	S
3.	Co 08020	1.6	MR
4.	CoSnk 08101	2.2	MS

## PROJECT NO. PP 22

1. **Title of the experiment** : Survey of Sugarcane diseases naturally occurring in the area on important Sugarcane varieties.
2. **Location** : Gujarat region
3. **Year** : 2013-2014
4. **Observation** : Periodic observations in various Sugar factory areas were recorded on the natural incidence of diseases on all the varieties under cultivation.

### 5. Results (Table 5)

Surveys were undertaken in twelve sugarcane growing sugar factories area of Gujarat region. The survey indicated that wilt, red rot and whip smut were the major diseases in South Gujarat region. Area affected under wilt, red rot and whip smut was 2.49, 2.34 and 6.05 per cent respectively. The incidence of smut was recorded on varieties like CoSi 95071, Co 86002, Co 97009, Co 99004 and CoN 07071. Maximum incidence of smut was recorded in the varieties CoSi 95071, Co 86002 and Co 97009 and it was to the tune of 15.1 % in Kamrej Sugar factory area. The wilt incidence noticed in CoC 671, Co 86032, Co 86002 and CoSi 95071 varieties and was maximum to the tune of 5.6 % in Ganesh sugar factory. The red rot was recorded in the varieties of CoC 671, Co 86032, Co 86002, Co 92020 and CoM 9011 and it was to the tune of 15.15 % in Pandvai Sugar factory area. Highest wilt and red rot incidence was noticed in variety CoC 671 and minimum in Co 86032. In addition to these diseases, the incidence of Pokkhah boeng disease was observed in Co 99004 in Kamrej sugar factory and surrounding area of Navsari. Grassy shoot, yellow leaf disease were found in traces at Mahuva and Bardoli sugar factory areas. Grassy shoot was observed on Co 86032 and yellow leaf disease was noticed on Co 86032 and Co 99004 .

**Table 5. Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties (2012-2013)**

<b>Sr. No.</b>	<b>Name of disease</b>	<b>Varieties</b>	<b>Location</b>
<b>1.</b>	<b>Wilt</b>	Co 86032, CoC 671, Co 97009,Co 86002, CoSi 95071,Co 86249, FL-2005	Gandevi, Bardoli, Sayan, Kamrej,Narmada, Maroli, Ganesh,Mahuva,Pandvai, Valsad,Madhi, and Coper
<b>2.</b>	<b>Red rot</b>	CoC 671 , Co 86032 Co 86002,Co 92020, CoM 9011	Gandevi, Bardoli, Sayan, Kamrej, Narmada, Ganesh,Mahuva,Pandvai, Valsad,Madhi, and Coper
<b>3.</b>	<b>Whip smut</b>	CoSi 95071, Co 97009, Co 86002, Co 99004, CoN 07071	Gandevi, Bardoli, Sayan, Kamrej, Narmada, Ganesh, Mahuva, Pandvai, Maroli Valsad, Madhi, and Coper
<b>4.</b>	<b>Pokkhah boeng</b>	Co 99004	Kamrej and Navsari area.
<b>5.</b>	<b>Grassy shoot</b>	Co 86032	Mahuva and Bardoli area.
<b>6.</b>	<b>Yellow leaf disease</b>	Co 86032, Co 99004	Bardoli sugar factory

**PP 22. Survey of naturally occurring Sugarcane disease in Gujarat (2013-14).**

Sr No.	Disease	Name of area Surveyed	% disease incidence	Varieties affected
1.	Red rot	Bardoli Sugar factory Dist: Surat	3.03	CoC 671, Co 86032, Co 86002
	Wilt		0.86	CoC 671, Co 86032, Co 86002, Co 86249, Co 8145, FL-2005
	Whip smut		8.86	Co 86002, CoSi 95071, Co 99004,
2.	Red rot	Kamrej Sugar factory Dist: Surat	3.73	Co 86002, Co 86032, CoC 671, CoSi 95071
	Wilt		4.83	Co 86032, Co 86002, CoC 671, FL-2005
	Whip smut		15.10	Co 86002, CoSi 95071, Co 99004, Co 97009
3.	Red rot	Vadodara District Co-Operative Sugar Factory, At:- Gandhara Dist: Vadodara	3.40	CoC 671, Co 86032
	Wilt		5.11	CoC 671, Co 86032
	Whip smut		3.81	Co 86002, CoSi 95071
4.	Red rot	Sayan Sugar Factory Dist: Surat	2.06	CoC 671, Co 86032, Co 86002
	Wilt		1.00	CoC 671, Co 86032, Co 86002
	Whip smut		4.00	Co 86002, CoSi 95071, Co 99004
5.	Red rot	Gandevi Sugar Factory Dist: Navsari	1.89	CoC 671, Co 86032, Co 86002, Co 97009
	Wilt		3.64	CoC 671, Co 86032, Co 86002, Co 97009, CoSi 95071,
	Whip smut		5.21	Co 86002, CoSi 95071, Co 97009
6.	Red rot	Pandvai Sugar Factory Dist: Bharuch	15.15	CoC 671
	Wilt		4.8	CoC 671, Co 86032
	Whip smut		6.59	CoSi 95071
7.	Red rot	Narmada Sugar Factory, Dharikheda, Dist: Narmada	5.00	CoC 671, Co 86032, Co 6304, Co 86002
	Wilt		1.89	CoC 671, Co 86032, Co 86002, Co 6304
	Whip smut		6.97	Co 86002, CoSi 95071
8.	Red rot	Valsad Sugar Factory Dist: Valsad	2.26	CoC 671, Co 97009
	Wilt		2.66	CoC 671, Co 97009
	Whip smut		8.99	CoSi 95071, Co 97009
9.	Red rot	Madhi Sugar Factory Dist: Surat	1.42	Co 86002, Co 86032, Co 92020, Co 9011
	Wilt		2.70	Co 86032, Co 86002
	Whip smut		5.83	Co 86002, Co 97009
10.	Red rot	Ganesh Sugar Factory Dist: Bharuch	5.52	CoC 671, Co 86032, Co 86002
	Wilt		5.60	CoC 671, Co 86002, Co 86032, CoSi 95071
	Whip smut		9.65	CoSi 95071, Co 86002
11.	Red rot	Co-Operative Sugar Factory Dist: Tapi	0.81	CoC 671, Co 86032, Co 86002
	Wilt		1.92	CoSi 95071, Co 86032, Co 86002, Co 86249
	Whip smut		6.45	CoSi 95071, Co 86002
12.	Red rot	Maroli Sugar Factory Dist: Navsari	0.19	CoC 671, Co 86032, Co 97009
	Wilt		0.66	CoC 671, Co 86032, Co 97009
	Whip smut		0.68	CoSi 95071, Co 86002, Co 97009

**PROJECT NO. PP 23**

1. **Title of the experiment** : Assessment of elite and ISH genotypes for resistance to red rot.
2. **Objective** : To gather information on *Saccharum sp.* and elite genotypes for resistance to red rot so that resistant genotypes could be used in breeding programme as possible donors for resistance.
3. **Year** : 2013-2014  
: **Location:** Navsari
4. **Test clones/No.** : 24
5. **Plot size** : Six meter row of each entry
6. **No. of isolates** : Local isolate
7. **Method of Inoculation** : Plug method as per PP 17.

**Inoculum:** Freshly sporulating, one week old culture on petridishes will be taken. The spore mass will be washed with 100 ml of sterile water and collected in a flask. Conidial suspension at a spore load of one million spores per ml of solution will be prepared.

8. **Method of evaluation** : As per details in PP17.

9. **Results (Table 6)**

At Navsari 24 elite and ISH genotypes were evaluated for resistance to red rot, one genotype SES 594 gave resistant reaction. Thirteen genotypes, viz., ISH 175, ISH 58, ISH 287, ISH 12, ISH 41, ISH 147, ISH 229, ISH 176, ISH 118, ISH 110, ISH 117, ISH 114 and ISH 115 were observed with moderately resistant reaction. Five genotypes viz., ISH 111, ISH 139, ISH 100, ISH 128 and ISH 103 showed moderately susceptible reaction. Three genotypes viz., ISH 50, ISH 69 and ISH 267 displayed susceptible reaction. Two genotypes viz., ISH 9 and ISH 43 exhibited highly susceptible reaction by plug method.



**Table 6. Assessment of elite and ISH genotypes for resistance to red rot (*Colletotrichum falcatum*)**

Sr.No.	Genotypes	Red rot ( Plug method )	
		Score	Reaction
1	ISH 111	4.8	MS
2	ISH 175	3.6	MR
3	ISH 139	5.2	MS
4	ISH 58	3.2	MR
5	ISH 100	4.8	MS
6	ISH 287	2.6	MR
7	ISH 12	3.0	MR
8	ISH 50	6.2	S
9	ISH 41	3.6	MR
10	ISH 147	3.4	MR
11	ISH 69	6.4	S
12	ISH 128	4.2	MS
13	ISH 267	7.0	S
14	ISH 229	3.7	MR
15	ISH 176	2.9	MR
16	ISH 103	5.2	MS
17	ISH 118	3.3	MR
18	ISH 110	3.0	MR
19	ISH 9	8.6	HS
20	ISH 43	8.4	HS
21	ISH 117	3.7	MR
22	ISH 114	3.0	MR
23	SES 594	1.0	R
24	ISH 115	3.3	MR

**PROJECT NO. PP 30**

1. Title of the experiment : Assessment of field resistance in sugarcane to red rot
2. Objective : To identify sugarcane varieties exhibiting field resistance to red rot
3. Year : 2013-2014  
: Location: Navsari
4. Test clones/No. : Two moderately resistant (by plug method) check, two field susceptible checks of the zone and 10-15 entries in IVT/AVT which are susceptible under nodal method of inoculation.
5. Plot size : Six meter row of each entry
6. Isolate : Local isolate (CoC 671)

**Inoculum preparation:**

Sorghum grains (partially broken grains without powdering) and sand mixture (1: 3 ratio) mixed with 100 ml of distilled water per kg mixture. The thoroughly mixed medium is to be distributed in container either in glass bottles or 500 ml capacity conical flask and sterilized at 15 lb pressure for 2 hours. After 2 days, medium is inoculated with mycelia/spore suspension. After 15 days of incubation at 27°C, the inoculum will be ready for application.

**Method of application:**

150 gram of inoculum/ 20 ft row is applied at the time of planting. The inoculum is to be applied on the setts in the furrows and covered with soil before irrigation and it has to be mixed with equal quantity of sand to have uniform distribution.

**Observation:**

Disease development is to be recorded at monthly intervals till maturity of crop. Disease development is indicated by death of seedlings, yellowing and drying of leaves, mid rib lesion in the whorl and production of dead hearts, which can not be pulled out easily as in early shoot borer. From affected seedlings/plant part, the pathogen should be re-isolated for confirming the presence of *Colletotrichum falcatum*. The information generated should be presented in tabular form giving details of symptoms observed after planting date as exemplified below.

**Table: Assessment of field resistance of sugarcane varieties to red rot**

S. No.	Variety	Resistance level (MR/S)	Symptoms observed followed by no. of days after planting	C. falcatum recovered (yes/no)	Any other informations
1.	CoC 671	Field S	SY(65), SM (90), CR (150), LY (160), CD (180)	Yes	All five clumps were affected
2.					
3.					
4.					

**Symptoms code:**

Yellowing of leaves in settling (SY), Drying of leaves in settling (SD), Settling mortality (SM), Rotting in inter nodal tissue of cane (CR), yellowing of spindle leaves (LS), Drying of spindle leaves (LD), Whole clump drying (CD).

**Results (Table 7):-** About 15 genotypes/varieties were tested under pathogen sick conditions in the field. The susceptible variety/genotypes CoC 671,,Co 86032,VSI 434, CoVSI 08122 and CoVC 08064 picked up infections in the field. However Co 09003 and CoM 08081 were observed moderately susceptible to red rot but behaved as field tolerant. The field moderately resistant varieties Co 09006, CoN 07071, Co 99004, CoN 05071, CoN 07072, CoN 08072, CoN 05072 and CoJn 08091 remained free from the disease.

**Table 7: Assessment of field resistance in sugarcane to red rot**

S.No.	Varieties	Resistance Level(MR/S)	Symptoms observed followed by no. of days after planting	<i>C. falcatum</i> recovered (Yes/No.)	Any other information
1.	Co 09006	MR	No symptoms observed	-	-
2.	CoC 671	HS	SY(25), SD (34), SM (65), CR (175), CD (220)	Yes	90 per cent clumps dried and dead
3.	CoN 07071	MR	No symptoms observed	-	-
4.	Co 99004	MR	No symptoms observed	-	-
5.	CoN 05071	MR	No symptoms observed	-	-
6.	CoN 07072	MR	No symptoms observed	-	-
7.	VSI 434	HS	SY(25), SD(36), SM(45), CR(165), LS(130), CD(205)	Yes	90 per cent clumps dried and dead
8.	CoN 08072	MR	No symptoms observed	-	-
9.	CoN 05072	MR	No symptoms observed	-	-
10.	Co 86032	HS	LS(245), LD(310), CD (325)	Yes	Disease appears later on all clumps
11.	Co 09003	MS	No symptoms observed	-	-
12.	CoVSI 08122	HS	SY(25), SD(30), SM(55), LS(220), LD(295), CD (220)	Yes	Plant dries and died probably due to wilt disease
13.	CoVC 08064	HS	LS(260), LD(325), CD (315)	Yes	Disease appears later on all clumps
14.	CoJn 08091	MR	No symptoms observed	-	-
15.	CoM 08081	MS	No symptoms observed	-	-