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No. RSRS /H-2/ AICRP(PATHO)/ /2012 Navsari Date:05 /06/2012

To,

Dr. R. Viswanathan,
Principal Scientist & Head,
Division of Crop Protection,
Sugarcane Breeding Institute,
Coimbatore (Tamilnadu),
Pin – 641 007.

Sub: Submission of Annual Reports **2011-2012** of Plant Pathology.

Dear Sir,

I am submitting herewith the results of the technical programme of **Sugarcane Plant Pathology** conducted under AICRP(S) at this station during **2011-2012** (Hard & soft copy). Kindly include the same in the Annual Report and oblige.

Thanking you sir,

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, N.A.U., Navsari

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ANNUAL REPORT

ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE

PLANT PATHOLOGY

(2011-2012)

NAVSARI AGRICULTURAL UNIVERSITY

REGIONAL SUGARCANE RESEARCH STATION

NAVSARI AGRICULTURAL UNIVERSITY

DANDI ROAD, NAVSARI – 396 450

Plant Pathology

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 : 2011-2012

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 60th 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 (Isolate-I), Co 86032 (Isolate-II) and Co 94012 (Isolate-III) 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. Entries Co 7717 and Co 62399 exhibited intermediate reaction to all the isolate. Entries CoC 671, Co 419 and CoJ 64 showed susceptible reaction to all the isolates. No any entry exhibited contrast disease reaction i.e. resistant and susceptible.

Table.1 Reaction of differentials to isolates of red rot (*Colletotrichum falcatum*) fungus (Plug method)

S. No	Pathotype/ isolates	Source	Reaction of 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 06	CoC 671	S	S	S	I	I	I	S	S	R	R	R	R	S	R
2.	Isolate-I	Co 86032	S	S	I	I	I	I	S	S	R	R	R	R	S	R
3.	Isolate-II	Co 94012	S	I	S	S	I	I	S	S	R	R	R	R	I	R

R= Resistant, I = Intermediate, S=Susceptible

PROJECT 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** : 2011-2012

5. **Varieties** : **67-** Zonal varieties (Table-2)

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. **Nodal method**
   Two canes in each of 10 clumps to be inoculated by pouring 1 ml of suspension in between the sheath and the stem as two opposite nodes in the middle of each cane. Inoculation to be done in month of August under high humidity conditions. The inoculum to be introduced into the axils of the 4^{th} and 5^{th} node from the top after slightly pulling the sheath.
2. **Plug method:**
   Two canes in each of the 10 clumps to be inoculated. Inoculation is to be done in the middle of the 3^{rd} 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. Inoculation to be done in the 2^{nd} fortnight of August or first week of September when 6 to 7 internodes are formed.

8. Evaluation :

1. Nodal inoculation:

One observation at the end of 30 days and the second at 60 days after inoculation. Observe for spindle infection. i.e., midrib lesions with or without conidia presence of acervuli at nodes especially on leaf scar, root primordial, growth ring. Record the intensity of acervuli at node scrap the nodes and see if the lesions are developing into stalks, whenever lesions are developing, evaluate 10 stalk, as per plug method of evaluation.

2. Plug method:

The cane split open longitudinally, sixty days after inoculation along the point of inoculation. Inoculated canes free of borer infestation and other damages are taken for evaluation. This is graded on the international scale of 0-9 as follow:

Variety Genotypes	No. of Canes Evaluated	Condi-tion of tops	Les-ion width (LW)	White spot (WS)	Nodal trans Gres-sion (NT)	Total	Remarks
G-111	1	0(G)	1	1	2	4	
	2	0(G)	1	1	1	3	
	3	0(G)	1	0	1	2	
	4	0(G)	1	1	2	4	
	5	0(G)	1	1	1	3	
	6	0(G)	1	1	2	4	
	7	0(G)	1	0	2	3	
	8	0(G)	1	1	1	3	
	9	0(G)	1	1	2	4	
	10	0(G)	1	0	3	4	

1. Condition of top green (G) yellow (Y) / Dry (D) = 1

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

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

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

1. If one node crossed
2. If two are crossed
3. If three are crossed (Maximum)

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 of the total score is taken for assigning the grade.

All the susceptible and highly susceptible varieties by nodal method are to be rejected. All highly susceptible and susceptible varieties by plug method to be screened. Such of these varieties which show susceptibility by plug inoculation but not by nodal inoculation to be again tested in the second year by the nodal method and if these merit release, may be considered for release.

9. Results : (Table 2)

Plug Method:

At Navsari, 67 Zonal varieties/ entries from IVT (Early), IVT (Midlate), AVT (Early I & II Plant), AVT (Midlate I & II Plant) and along with susceptible check (CoC 671) were evaluated for resistance to red rot. Inoculation was made in the third week of August by plug as well as nodal methods using local isolates.

Out of 67 varieties of zonal trial evaluated by plug method, none of the entries exhibited resistant reaction. Thirty two entries viz., Co 08001, CoN 08071 and PI 08131 (IVT-E), Co 08007, Co 08008, Co 08009, Co 08020, CoJn 08091, CoN 08072, CoSnk 08101 and CoVC 08062 (IVT-ML), Co 07001, Co 07012, Co 07015, CoN 07071, CoN 07072, MS 07081, PI 07131 and PI 07132 (AVT–E I plant)**,** Co 06001, Co 06002 and CoM 06082 (AVT-E II Plant), Co 07006, Co 7007, Co 07008, Co 07009, CoN 07073 and CoSnk 07103 (AVT-ML I Plant), Co 06010, Co 06012, Co 06027 and CoM 06084 (AVT-ML II Plant) showed moderately resistant reaction against red rot.

Thirteen entries viz., Co 08018, CoM 08081, CoVC 08063 and CoVSI 08123 (IVT-ML), MS 07082 and CoSnk 07101 (AVT-E I Plant), Co 06002 and PI 06132 (AVT-E II Plant), Co 07010 and CoSnk 07105 (AVT-ML I plant), Co 06013, Co 6014 and Co 06015(AVT-ML II Plant) exhibited moderately susceptible reaction. Rest of entries displayed susceptible to highly susceptible reaction to red rot by plug method

Check Co 94008 (IVT-E) exhibited moderately resistant reaction. Two checks Co 85004 (IVT-E) and Co 7219(IVT-ML) showed moderately susceptible reaction. Co 86032 (IVT-ML) displayed susceptible reaction, while one check Co 671 (IVT-E) exhibited highly susceptible reaction.

Nodal Method

In nodal method, five entries *viz.,* CoN 08071 (IVT-E), Co 07001 and PI 07132 (AVT-E I Plant), Co 06001 (AVT-E II Plant) and Co 06010 (AVT-ML II Plant) gave resistant reaction. While Forty Five entries *viz*, Co 08001, Co 08006 and PI 08131 (IVT-E), Co 08007, Co 08008, Co 08009, Co 08018, Co 08019, Co 08020, CoJn 08091, CoM 08081,CoN 08072,CoSnk 08101,CoVC 08061,CoVC 08062,CoVC 08063 and CoVSI 08123 (IVT-ML), Co 07003, Co 07012, Co 07015,CoN 07071,CoN 07072,MS 07081,CoJn 07092 and PI 07131 (AVT-E I Plant), Co 06002, CoM 06082 and PI 06132 (AVT-E II Plant), Co 07006, Co 07007, Co 07008, Co 07009,Co 07010,CoN 07073,CoSnk 07103,CoSnk 07104 and CoSnk 07105 (AVT-ML I Plant), Co 06007, Co 06012, Co 06014, Co 06015 ,Co 06020,Co 06027,CoM 06084 and CoSnk 03632 (AVT-ML II Plant) exhibited moderately resistant reaction. Eight entries Co 08016, CoVC 08064 and CoVSI 08123 (IVT-ML), MS 07082, CoSnk 07101 and CoSnk 07132 (AVT-E-I

Plant), Co 06022 (AVT-E II Plant), Co 06013 (AVT-ML II plant) were found moderately susceptible. Rest of entries displayed to highly susceptible reaction to red rot by nodal method.

Four checks viz, Co 85004 and Co 94008 (IVT-E), Co 07219 and Co 86032 (IVT-ML) gave moderately resistant reaction. While, CoC 671 (IVT-E) exhibited highly susceptible reaction.

Table 2. Evaluation of pre – zonal / IVT / Zonal varieties/ genotypes for resistance to red rot *(Colletotrichum falcatum)* (2011-2012)

Sr. No.	Varieties	Plug method		Nodal method	
		Score	Reaction	Score	Reaction
1.	2.	3.	4.	5.	6.
(I)	**Initial Varietal Trial (Early)**				
1.	Co 08001	3.9	MR	2.4	MR
2.	Co 08006	6.2	S	3.2	MR
3.	CoN 08071	3.0	MR	1.6	R
4.	PI 08131	2.8	MR	2.2	MR
5.	VSI 08121	8.6	HS	6.8	S
Standard					
1.	Co 85004	4.2	MS	3.0	MR
2.	Co 94008	2.3	MR	2.3	MR
3.	CoC 671	8.8	HS	8.2	HS
(II)	**Initial Varietal trial (Midlate)**				
1.	Co 08007	3.0	MR	2.8	MR
2.	Co 08008	3.2	MR	2.6	MR
3.	Co 08009	2.8	MR	2.2	MR
4.	Co 08016	6.4	S	4.4	MS
5.	Co 08018	4.2	MS	2.6	MR
6.	Co 08019	6.8	S	3.2	MR
7.	Co 08020	2.7	MR	2.4	MR

8.	CoJN 08091	2.4	MR	2.1	MR
9.	CoM 08081	5.3	MS	3.6	MR
10.	CoN 08072	3.2	MR	2.4	MR
11.	CoSnk 08101	3.4	MR	2.8	MR
12.	CoVC 08061	8.2	HS	3.8	MR
13.	CoVC 08062	3.0	MR	2.8	MR
14.	CoVc 08063	4.8	MS	3.8	MR
15.	CoVc 08064	8.3	HS	4.8	MS
16.	CoVSI 08122	6.5	S	4.4	MS
17.	CoVSI 08123	5.8	MS	3.4	MR
Standard					
1.	Co 7219	4.5	MS	2.6	MR
2.	Co 86032	8.0	S	4.0	MR
(III)	**Advanced Varietal Trial- Early I Plant**				
1.	Co 07001	3.4	MR	1.6	R
2.	Co 07003	9.0	HS	3.9	MR
3.	Co 07012	3.2	MR	2.8	MR
4.	Co 07015	2.4	MR	2.2	MR
5.	CoN 07071	2.4	MR	2.2	MR
6.	CoN 07072	2.7	MR	2.4	MR
7.	MS 07081	3.6	MR	2.1	MR
8.	MS 07082	5.6	MS	4.6	MS
9.	CoJn 07092	6.3	S	2.8	MR
10.	CoSnk 07101	5.2	MS	4.3	MS
11.	CoSnk 07132	6.9	S	4.3	MS
12.	PI 07131	4.0	MR	3.2	MR
13.	PI 07132	3.6	MR	1.4	R

(IV)	**Advanced Varietal Trial- Early II Plant**				
1.	Co 06001	2.8	MR	1.6	R
2.	Co 06002	3.1	MR	2.6	MR
3.	Co 06022	4.6	MS	4.2	MS
4.	CoM 06082	3.0	MR	2.4	MR
5.	PI 06132	4.1	MS	3.6	MR
(V)	**Advanced Varietal Trial- Midlate I Plant**				
1.	Co 07006	2.7	MR	2.4	MR
2.	Co 07007	3.4	MR	2.4	MR
3.	Co 07008	2.9	MR	2.2	MR
4.	Co 07009	2.6	MR	2.1	MR
5.	Co 07010	5.7	MS	3.4	MR
6.	CoN 07073	3.4	MR	2.4	MR
7.	CoM 07083	8.3	HS	8.2	HS
8.	CoJn 07093	9.0	HS	8.1	HS
9.	CoJn 07094	8.4	HS	7.2	S
10.	CoSnk 07103	4.0	MR	3.0	MR
11.	CoSnk 07104	6.2	S	3.2	MR
12.	CoSnk 07105	5.2	MS	3.4	MR
(VI)	**Advanced Varietal Trial- Midlate II Plant**				
1.	Co 06007	8.3	HS	3.6	MR
2.	Co 06010	2.8	MR	1.8	R
3.	Co 06012	2.4	MR	2.2	MR
4.	Co 06013	4.9	MS	4.1	MS
5.	Co 06014	4.2	MS	3.2	MR
6.	Co 06015	4.1	MS	2.8	MR
7.	Co 06020	9.0	HS	3.8	MR
8.	Co 06027	3.1	MR	2.8	MR
9.	CoM 06084	3.2	MR	3.0	MR
10.	CoSnk 03632	6.3	S	3.4	MR

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**	**:**	2011-2012
	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.

0 per cent	**:**	**Resistance**
0.1 to 10 per cent	**:**	**Moderately Resistance**
10.1 to 20 per cent	**:**	**Moderately Susceptible**
21.1 to 30 per cent	**:**	**Susceptible**
> 30 per cent	**:**	**Highly susceptible**

Results: (Table 3)

At Navsari, 60 Zonal varieties/ entries from IVT (Early), IVT (Midlate), AVT (Early I & II Plant), AVT (Midlate I & II Plant), along with checks (Co 85004, CoC 671, Co 86032,Co 99004, CoSi 95071, Co 6806, Co 7527 and Co 94008) were evaluated for resistance to smut.

Out of 60 varieties of zonal trial evaluated for smut disease, Twenty three entries exhibited resistant reaction viz., Co 08001, Co 08006 and CoN 08071(IVT-E), Co 08009, Co 08016, Co 08018, CoM 08081,CoVC 08062,CoVC 08063,CoVC 08064,CoVSI 08122 and CoVSI 08123 (IVT-ML), Co 07003,CoN 07072,MS 07082 and CoJn 07092 (AVT-E I Plant), Co 06001 and Co 06022 (AVT-E II Plant), Co 07006 and Co 07009 (AVT-ML I Plant), Co 06007,Co 06010 and CoM 06084 (AVT-ML II Plant). Nineteen entries viz., VSI 08121 (IVT-E), Co 08019, CoN 08072 and CoVC 08061(IVT-ML), Co 07001,Co 07012,MS 07081,CoSnk 07101,CoSnk 07102, PI 07131 and PI 07132 (AVT–E I Plant)**,** PI 06132 (AVT-E II Plant), Co 07006, Co 07010, CoJn 07093 and CoJn 07094 (AVT-ML I Plant), Co 06013,Co 06014 and Co 06027(AVT-ML II Plant) showed moderately resistant reaction to smut. Four entries Viz., Co 06002 (AVT-E II Plant), CoM 07083(AVT-ML I Plant), Co 06012 and Co 06015 (AVT-ML II Plant) exhibited moderately susceptible reaction. Rest of the clones showed susceptible to highly susceptible reaction to smut. Eight checks viz, Co 6806 and Co 7527 gave resistant reaction. While, CoC 671 and Co 86032 exhibited moderately resistant reaction. One check viz., Co 99004 showed moderately susceptible reaction, while rest of clones 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
(I)	**Initial Varietal Trial (Early)**						
1.	Co 08001	0.00	R	4.	PI 08131	32.12	HS
2.	Co 08006	0.00	R	5.	VSI 08121	2.80	MR
3.	CoN 08071	0.00	R				
(II)	**Initial Varietal Trial (Midlate)**						
1.	Co 08009	0.00	R	7.	CoVC 08061	9.20	MR
2.	Co 08016	0.00	R	8.	CoVC 08062	0.00	R
3.	Co 08018	0.00	R	9.	CoVc 08063	0.00	R
4.	Co 08019	2.80	MR	10.	CoVc 08064	0.00	R
5.	CoM 08081	0.00	R	11.	CoVSI 08122	0.00	R
6.	CoN 08072	5.00	MR	12.	CoVSI 08123	0.00	R
(III)	**Advanced Varietal Trial- Early I Plant**						
1.	Co 07001	2.11	MR	8.	MS 07082	0.00	R
2.	Co 07003	0.00	R	9.	CoJN 07092	0.00	R
3.	Co 07012	2.80	MR	10.	CoSnk 07101	8.20	MR
4.	Co 07015	22.17	S	11.	CoSnk 07102	2.80	MR
5.	CoN 07071	36.65	HS	12.	PI 07131	5.00	MR
6.	CoN 07072	0.00	R	13.	PI 07132	4.20	MR
7.	MS 07081	8.25	MR				

(IV)	**Advanced Varietal Trial- Early II Plant**						
1.	Co 06001	0.00	R	3.	Co 06022	0.00	R
2.	Co 06002	14.01	MS	4.	PI 06132	5.00	MR
(V)	**Advanced Varietal Trial- Midlate I Plant**						
1.	Co 07006	9.20	MR	6.	CoJN 07093	6.25	MR
2.	Co 07008	0.00	R	7.	CoJN 07094	5.00	MR
3.	Co 07009	0.00	R	8.	CoSnk 07103	28.35	S
4.	Co 07010	8.25	MR	9.	CoSnk 07104	35.12	HS
5.	CoM 07083	12.25	MS	10.	CoSnk 07105	20.18	S
(VI)	**Advanced Varietal Trial- Midlate II Plant**						
1.	Co 06007	0.00	R	5.	Co 06014	9.20	MR
2.	Co 06010	0.00	R	6.	Co 06015	18.25	MS
3.	Co 06012	12.52	MS	7.	Co 06027	8.25	MR
4.	Co 06013	8.25	MR	8.	CoM 06084	0.00	R
Standard							
1.	Co 85004	32.83	HS	4.	CoSi 95071	39.12	HS
2.	CoC 671	9.20	MR	5.	Co 6806	0.00	R
3.	Co 86032	8.25	MR	6.	Co 7527	38.50	HS
7.	Co 99004	10.25	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**	**:**	2011-2012
	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 he 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.

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

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

7. Results

At Navsari, 31 AVT varieties including susceptible check (CoC 671) were evaluated for resistance to wilt under wilt sick plot. Out of 31 AVT varieties, none of the entries showed resistant reaction. Twelve entries viz., Co 07012, Co 07015, CoN 07071 and CoN 07072 (AVT-E I Plant), Co 06002 and CoM 06082 (AVT-E II Plant), Co 07007 and Co 07008 (AVT-ML I Plant), Co 06010, Co 06014, CoM 06084 and CoSnk 03632 (AVT-ML II Plant) showed moderately resistant reaction. Eight entries depicted moderately susceptible reaction to wilt viz., Co 06001 (AVT-E II Plant), Co 07006, Co 07009 and CoSnk 07103 (AVT-ML I Plant), Co 06007, Co 06012, Co 06013 and Co 06015 (AVT-ML II Plant). Remaining entries showed susceptible reaction to wilt.

Data indicate that one each zonal checks viz Co 94008 and Co 85004 (AVT-E) showed moderately resistance and moderately susceptible reaction respectively. While check CoC 671 (AVT-E) gave susceptible reaction to wilt. Whereas, one check each Co 7219 and Co 86032 (AVT-ML) gave moderately susceptible and susceptible reaction respectively (Table 4).

Table 4: Evaluation of sugarcane varieties against wilt diseases in wilt sick plot at Regional Sugarcane Research Station. Navsari Agricultural University, Navsari during 2011-2012

Sr. No.	Variety	Wilt	
		Index	Reaction
1.	2.	3.	4.
(I)	**Advanced Varietal Trial- Early I Plant**		
1.	Co 07012	1.4	MR
2.	Co 07015	1.2	MR
3.	CoN 07071	1.6	MR
4.	CoN 07072	1.4	MR
5.	PI 07131	3.2	S
Standard			
1.	Co 85004	2.2	MS
2.	Co 94008	1.5	MR
3.	CoC 671	4.0	S
(II)	**Advanced Varietal Trial- Early II Plant**		
1.	Co 06001	2.4	MS
2.	Co 06002	1.8	MR
3.	Co 06022	3.4	S
4.	CoM 06082	1.6	MR
5.	PI 06132	3.6	S
Standard			
1.	Co 7219	2.3	MS
2.	Co 86032	3.2	S

(III)	**Advanced Varietal Trial- Midlate I Plant**		
1.	Co 07006	2.4	MS
2.	Co 07007	1.4	MR
3.	Co 07008	1.6	MR
4.	Co 07009	2.6	MS
5.	Co 07010	3.3	S
6.	CoSnk 07103	2.1	MS
(IV)	**Advanced Varietal Trial- Midlate II Plant**		
1.	Co 06007	3.4	MS
2.	Co 06010	1.7	MR
3.	Co 06012	2.8	MS
4.	Co 06013	3.4	MS
5.	Co 06014	1.6	MR
6.	Co 06015	2.4	MS
7.	Co 06020	3.8	S
8.	Co 06027	3.4	S
9.	CoM 06084	1.2	MR
10.	CoSnk 03632	1.4	MR

PROJECT NO. PP 22

1. **Title of the experiment** : Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties.
2. **Location** : South Gujarat and Saurashtra Region
3. **Year** : 2011-2012
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 eleven sugarcane growing sugar factories area of South Gujarat and Saurashtra 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 2.91, 3.08 and 3.70 per cent respectively. The incidence of smut was recorded on varieties like CoSi 95071, Co 86002, Co 97009, CoN 95132,Co 99004 and CoN 07071. Maximum incidence of smut was recorded in the variety CoSi 95071 and it was to the tune of 7 to 8 % in Narmada and Ganesh sugar factory areas. The wilt incidence noticed only CoC 671, Co 86032, Co 86002 and CoSi 95071 and was maximum to the tune of 8 % in Talala sugar factory. The red rot was recorded in the varieties of CoC 671, Co 86032, C0 86002, CoN 95132, VSI 434, Co 95012 and Co 94012. 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 Pineapple disease was observed in Co 95006 Chalthan sugar factory and surrounding area of Navsari. Grassy shoot, Pokkhah boeng were found in traces only at few places. Grassy shoot and Pokkhah boeng were noticed on Co 86032 and Co 99004 respectively.

Table 5. Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties (2011-2012)

Sr. No.	Name of disease	Varieties	Location
1.	**Wilt**	Co 86032, Co 6304, CoC 671, Co 97009,Co 86002, CoSi 95071, Co 86249	Gandevi, Bardoli, Sayan, Kamrej,Chalthan,Maroli, Narmada, Valsad, Madhi and Talala
2.	**Red rot**	CoC 671,Co 97009, Co 86002, Co 6304, CoVSI 434, Co 95012, Co 94012, CoN 95132, Co 86032 ,	Gandevi, Bardoli, Sayan, Kamrej, Chalthan, Narmada,Maroli, Valsad, Madhi and Talala
3.	**Whip smut**	CoSi 95071, Co 97009, Co 86002, CoN 95132, Co 99004, CoN 07071	Gandevi, Bardoli, Sayan, Kamrej, Chalthan, Narmada,Maroli, Valsad, Madhi and Talala
4.	**Pineapple disease**	Co 95006	Chalthan and Navsari area.
5.	**Grassy shoot**	Co 86032, CoSi 95071	Chalthan and Bardoli area.
6.	**Pokkhah boeng**	Co 86032, Co 99004	Kamrej, Bardoli sugar factory and Navsari area.

PP 22. Survey of naturally occurring sugarcane disease in Gujarat (2011-12).

Sr No.	Disease	Name of area Surveyed	% disease incidence	Varieties affected
1.	Red rot	Bardoli Sugar factory Dist: Surat	2.10	CoC 671, Co 86032
	Wilt		1.65	CoC 671,Co 86032, Co 86002, Co 86249, Co 97009
	Whip smut		1.74	Co 86002,CoSi 95071, Co 99004, Co 97009,Co 99004
2.	Red rot	Kamrej Sugar factory Dist: Surat	1.73	Co 86002, Co 86032, CoC 671
	Wilt		2.10	Co 86032, Co 86002, CoC 671, CoSi 95071,
	Whip smut		3.22	Co 86002,CoSi 95071, Co 99004
3.	Red rot	Chalthan Sugar Factory Dist: Surat	3.05	CoC 671, Co 86032,
	Wilt		2.65	CoC 671,Co 86032, Co 86002, CoSi 95071
	Whip smut		4.01	Co 86002, CoSi 95071, Co 97009,Co 99004
4.	Red rot	Sayan Sugar Factory Dist: Surat	1.06	CoC 671, Co 86032, Co 86002
	Wilt		2.92	CoC 671,Co 86032, CoM 0265,Co 86002
	Whip smut		3.03	Co 86002,CoSi 95071,
5.	Red rot	Gandevi Sugar Factory Dist: Navsari	1.60	CoC 671,Co 86032, Co 86002
	Wilt		2.40	CoC 671,Co 86032, Co 86002, Co 97009, CoSi 95071, Co 86249
	Whip smut		1.80	Co 86002,CoSi 95071, Co 97009
6.	Red rot	Maroli Sugar Factory Dist: Navsari	0.20	CoC 671, Co86032
	Wilt		0.70	CoC 671,Co 86032,Co 86002
	Whip smut		0.85	CoSi 95071, Co 97009, Co 86002
7.	Red rot	Narmada Sugar Factory, Dharikheda, Dist: Narmada	4.86	CoC 671, Co 86032, Co 6304
	Wilt		1.51	CoC 671,Co 86032, Co 86002, Co 6304
	Whip smut		7.03	Co 86002,CoSi 95071
8.	Red rot	Valsad Sugar Factory Dist: Valsad	2.67	CoC 671, Co 97009
	Wilt		3.82	CoC 671, Co 97009
	Whip smut		4.18	Co 86002, Co 97009
9.	Red rot	Madhi Sugar Factory Dist: Surat	1.23	CoC 671, Co 86032
	Wilt		1.05	Co 86032, CoC 671
	Whip smut		4.82	CoSi 95071,Co 86002, Co 97009
10.	Red rot	Ganesh Sugar Factory Dist: Bharuch	5.20	CoC 671,Co 86032, Co 86002
	Wilt		6.02	CoC 671, Co 86002, Co 86032, CoSi 95071
	Whip smut		8.32	CoSi 95071, Co 86002
11.	Red rot	Talala Sugar Factory Dist: Junagadh	10.00	CoC 671, Co 86032
	Wilt		8.00	CoC 671, Co 86032
	Whip smut		1.50	CoC 671

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** : 2011-2012

   : **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. Fourteen genotypes, viz., ISH 111, ISH 175, ISH 287, ISH 12, ISH 50, ISH 147, ISH 69, ISH 128, ISH 229, ISH 176,ISH 103, ISH 117,ISH 114 and ISH 115 were observed with moderately resistant reaction. Three genotypes viz., ISH 58, ISH 100 and ISH 118 showed moderately susceptible reaction. Five genotypes viz., ISH 139, ISH 41, ISH 267, ISH 110 and ISH 43 displayed susceptible reaction. One genotype viz., ISH 9 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	3.0	MR
2	ISH 175	2.8	MR
3	ISH 139	6.1	S
4	ISH 58	5.1	MS
5	ISH 100	4.8	MS
6	ISH 287	3.0	MR
7	ISH 12	3.0	MR
8	ISH 50	3.2	MR
9	ISH 41	6.5	S
10	ISH 147	2.6	MR
11	ISH 69	3.2	MR
12	ISH 128	2.8	MR
13	ISH 267	7.1	S
14	ISH 229	2.8	MR
15	ISH 176	3.0	MR
16	ISH 103	3.2	MR
17	ISH 118	4.7	MS
18	ISH 110	7.0	S
19	ISH 9	8.6	HS
20	ISH 43	6.4	S
21	ISH 117	3.4	MR
22	ISH 114	3.0	MR
23	SES 594	1.5	R
24	ISH 115	2.9	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	:	2011-2012
	:	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 settlings, 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 settlings/plant part, the pathogen should be re-isolated for confirming the presence of *Colletotrichum falcatum.* The information generated should be presented in tabular from 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.					

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 16 genotypes/varieties were tested under pathogen sick conditions in the field. The susceptible variety/genotypes Co 07003,CoC 671,Co 07006,Co 86032 and MS 06010 picked up infections in the field. However CoJn 07091 MS and CoVc 07061 S to red rot also exhibited the disease symptoms. The other genotypes MS and S to red rot viz., CoJn 07092, CoSnk 05101,CoVSI 05122 and CoM 06082 behaved as field tolerant .The field moderately resistant varieties CoN 05071,Co 06001,CoN 05072 and Co 05001 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	*C. falcatum* recovered (Yes/No.)	Any other information
1.	Co 07003	HS	SY(25), SD(32), SM(35), CR(120), LS(130), CD(190)	Yes	Diseases appears in all clumps, SD in 7 saplings and SM in 6
2.	CoC 671	HS	SY(25), SD (30), SM (90), CR (190), CD (210)	Yes	90 per cent clumps dried and dead
3.	CoJn 07092	MS	No symptoms observed	-	-
4.	CoJn 07091	MS	SY (50), SD (61), SM (95),	Yes	Few clumps infected early other remain healthy till 11 month
5.	CoN 05071	MR	No symptoms observed	-	
6.	Co 94008	MS	No symptoms observed	-	
7.	Co 07006	HS	SY(25), SD(32), SM(35), CR(120), LS(130), CD(190)	Yes	90 per cent clumps dried and dead
8.	Co 06001	MR	No symptoms observed	-	
9.	CoN 05072	MR	No symptoms observed	-	
10.	Co 86032	HS	LS(230), LD(300), CD (335)	Yes	Disease appears later on all clumps
11.	CoSnk 05101	S	No symptoms observed		
12.	CoVC 07061	S	LS(220), LD(260), CD (320)	Yes	Plant dries and died probably due to wilt disease
13.	CoVSI 05122	MS	No symptoms observed	-	
14.	Co 05001	MR	No symptoms observed	-	
15.	CoM 06082	S	No symptoms observed	-	
16.	MS 06010	HS	SY(25), SD(32), SM(35), CR(120), LS(130), CD(190)	Yes	Diseases appears in all clumps, SD in 7 saplings and SM in 6