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Navsari Agricultural University**

Navsari

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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 **2012-2013** of Plant Pathology.

Dear Sir,

I am submitting herewith the results of the technical programme of **Sugarcane Plant Pathology** conducted at this station during **2012-2013** (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

(2012-2013)



MAIN SUGARCANE RESEARCH STATION
NAVARI AGRICULTURAL UNIVERSITY
DANDI ROAD, 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** : 2012-2013
- 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 (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, BO 91, Baragua and SES 594 showed resistant reaction for all the isolates. Entry CoS 8436 showed intermediate reaction on Cf 94012 isolate. Entries Co 7717 and Co 62399 exhibited intermediate reaction to all the isolates. While Co 1148 showed susceptible reaction on Cf 94012. Entries Co 975 and Co 997 gave intermediate reaction on Cf 94012 and Cf 86032 respectively. Entries CoC 671, Co 419, CoJ 64 and Khakai showed susceptible reaction to all the isolates.

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

Sl. 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	CoC 671	S	S	S	I	I	I	S	S	R	R	R	R	S	R
2.	Cf 86032	Co 86032	S	S	I	I	I	I	S	S	R	R	R	R	S	R
3.	Cf 94012	Co 94012	S	I	S	S	I	I	S	S	R	I	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** : 2012-2013
- 5. Varieties** : **54-** Zonal varieties
15 - Newly developed clones and other varieties
27- other centre clones
96 – Total 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 4th and 5th 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 3rd 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 2nd 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, 96 Zonal varieties/ entries from IVT (Early), IVT (Midlate), AVT (Early I & II Plant), AVT (Midlate I & II Plant), clonal stage- 3 & 4 along with susceptible check (CoC 671) were evaluated for resistance to red rot. Inoculation was done in the third 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 Five entries viz., Co 09004, Co 09005, Co 09006, Co 09007 and CoN 09071 (IVT-E), Co 09009, Co 09012, Co 09014, CoN 09073, CoN 09074 and CoSnk 05102 (IVT-ML), PI 08131 (AVT-E I plant), Co 07012, CoN 07071 and PI 07131 (AVT-E II Plant), Co 08008, Co 08009, CoSnk 08101, CoJn 08091, CoM 08081, CoN 08072, CoVC 08064, CoVSI 08122 and Co 08007 (AVT-ML I Plant), Co 07009 (AVT-ML II Plant) showed moderately resistant reaction against red rot.

Ten entries viz., Co 09002, Co 09003 and CoN 09072 (IVT-E), Co 09013 (IVT-M), Co 08001 (AVT-E I Plant), Co 08018 and CoVC 08062 (AVT-ML I Plant), Co 07006, Co 07007 and Co 07008 (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 Method

In nodal method, Eight entries *viz.*, Co 09006 and CoN 09071 (IVT-E), Co 09012, CoN 09073 and CoN 09074 (AVT-ML), PI 07131 (AVT-E II Plant), CoN 08072 (AVT-ML I Plant), Co 07009 (AVT-ML II Plant) gave resistant reaction. While Thirty one entries *viz.*, Co 09002, Co 09004, Co 09005, Co 09007 and CoN 09072 (IVT-E), Co 09009, Co 09013, Co 09014 and CoSnk 05102 (IVT-ML), Co 08001, Co 08006, CoN 08071 and PI 08131 (AVT-E I Plant), Co 07012, Co 07015 and CoN 07071 (AVT-E II Plant), Co 08008, Co 08009, Co 08020, CoSnk 08101, Co 08018, CoJn 08091, CoM 08081, CoVC 08061, CoVC 08062, CoVC 08063, CoVC 08064, CoVSI 08122 and Co 08007 (AVT-ML I Plant), Co 07006 and Co 07008 (AVT-ML II Plant) exhibited moderately resistant reaction. Six entries Co 09003 (IVT-E), Co 02040 (AVT-ML), VSI 08121 (AVT-E I Plant), Co 08016 Co 08019 and CoVSI 08123 (AVT-ML I plant) were found moderately susceptible. Rest of entries displayed susceptible to highly susceptible reaction to red rot by nodal method.

One check *viz.*, Co 99004 (IVT-ML) gave resistant reaction. While, Three checks Co 85004 and Co 94008 (IVT-E), Co 86032 (IVT-ML) showed moderately resistant reaction. One check CoC 671 (IVT-E) exhibited highly susceptible reaction.

Out of other four (4) clones which were evaluated by plug method for red rot, two entries *viz.*, Co 99006 and Co 11015 showed moderately resistant reaction. While one entry CoVSI 9805 exhibited susceptible reaction and Co 91017 displayed highly susceptible reaction. In nodal method three entries *viz.*, Co 91017, Co 99006 and CoVSI 9805 showed moderately resistant reaction.

Table 2. PP 17(a) Evaluation of pre – zonal / IVT / Zonal varieties/ genotypes for resistance to red rot (*Colletotrichum falcatum*) (2012-2013)

Sr. No.	Varieties	Plug method		Nodal method	
		Score	Reaction	Score	Reaction
1.	2.	3.	4.	5.	6.
(I)	Initial Varietal Trial (Early)				
1.	Co 09002	4.8	MS	2.2	MR
2.	Co 09003	5.6	MS	4.1	MS
3.	Co 09004	3.0	MR	2.6	MR
4.	Co 09005	3.6	MR	3.0	MR
5.	Co 09006	2.8	MR	1.6	R
6.	Co 09007	3.8	MR	3.2	MR
7.	CoN 09071	2.8	MR	1.8	R
8.	CoN 09072	4.6	MS	2.8	MR
Standard					
1.	Co 85004	4.8	MS	3.2	MR
2.	Co 94008	3.6	MR	2.2	MR
3.	CoC 671	9.0	HS	8.2	HS
(II)	Initial Varietal Trial (Midlate)				
1.	Co 09009	3.0	MR	2.7	MR
2.	Co 09010	8.8	HS	6.4	S
3.	Co 09012	2.6	MR	1.5	R
4.	Co 09013	5.0	MS	2.9	MR
5.	Co 09014	3.2	MR	2.1	MR
6.	Co 02040	7.2	S	4.8	MS
7.	CoN 09073	2.8	MR	1.4	R
8.	CoN 09074	2.4	MR	1.8	R
9.	CoSnk 05102	3.2	MR	2.2	MR
10.	CoVSI 09121	8.6	HS	6.2	S

Standard

1.	Co 99004	3.2	MR	1.8	R
2.	Co 86032	8.2	HS	3.4	MR
(III)	Advanced Varietal Trial- Early I Plant				
1.	Co 08001	5.2	MS	3.2	MR
2.	VSI 08121	8.4	HS	4.8	MS
3.	Co 08006	8.2	HS	3.2	MR
4.	CoN 08071	8.4	HS	3.4	MR
5.	PI 08131	3.8	MR	2.8	MR
(IV)	Advanced Varietal Trial- Early II Plant				
1.	Co 07012	3.4	MR	2.6	MR
2.	Co 07015	6.6	S	3.8	MR
3.	CoN 07071	2.8	MR	2.2	MR
4.	PI 07131	3.6	MR	1.8	R
(V)	Advanced Varietal Trial- Midlate I Plant				
1.	Co 08008	3.6	MR	2.8	MR
2.	Co 08009	3.2	MR	2.6	MR
3.	Co 08016	8.8	HS	4.4	MS
4.	Co 08020	8.2	HS	3.8	MR
5.	CoSnK 08101	3.6	MR	3.0	MR
6.	Co 08018	4.8	MS	3.0	MR
7.	Co 08019	8.4	HS	5.2	MS
8.	CoJn 08091	3.8	MR	2.6	MR
9.	CoM 08081	3.0	MR	2.8	MR
10.	CoN 08072	2.6	MR	1.6	R
11.	CoVC 08061	6.8	S	3.2	MR
12.	CoVC 08062	4.8	MS	2.8	MR
13.	CoVC 08063	6.6	S	3.2	MR
14.	CoVC 08064	2.8	MR	2.4	MR

15.	CoVSI 08122	3.8	MR	3.2	MR
16.	CoVSI 08123	8.6	HS	4.8	MS
17.	Co 08007	3.6	MR	3.0	MR
(VI)	Advanced Varietal Trial- Midlate II Plant				
1.	Co 07006	4.8	MS	2.8	MR
2.	Co 07007	5.8	MS	4.6	MS
3.	Co 07008	4.8	MS	3.4	MR
4.	Co 07009	3.2	MR	1.8	R
5.	Co 07010	8.4	HS	6.2	S
(VII)	Other Varieties				
12.	Co 91017	8.8	HS	2.4	MR
13.	Co 99006	3.6	MR	3.2	MR
14.	CoVSI 9805	7.6	S	2.9	MR
15.	Co 11015	3.6	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** : 2012-2013
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, 55 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 55 varieties of zonal trial evaluated for smut disease, fifteen entries exhibited resistant reaction viz., Co 09003, and Co 09007 (IVT-E), VSI 08121, Co 08006 and CoN 08071 (AVT-E I Plant), Co 08020, CoSnk 08101, Co 08019, CoM 08081, CoN 08072, CoVC 08064 and CoVSI 08123 (AVT-ML I Plant), Co 07007, Co 07008 and Co 07009 (AVT-ML II Plant) exhibited resistant reaction. Similarly fourteen entries viz., Co 09004 and Co 09006 (IVT-E), Co 08001 (AVT-E I Plant), Co 07012, Co 07015 and PI 07131 (AVT-E II Plant), Co 08009, Co 08016, Co 08018, CoJn 08091, Co 08007 and CoVSI 08122 (AVT-ML I Plant), Co 07006 and Co 07010 (AVT-ML II Plant) showed moderately resistant reaction to smut. Four entries viz., Co 09005 (AVT-E), Co 09014 (AVT-ML), Co 08008 and CoVC 08063 (AVT-ML I 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
(I)	Initial Varietal Trial (Early)						
1.	Co 09002	34.50	HS	5.	Co 09006	8.50	MR
2.	Co 09003	0.00	R	6.	Co 09007	0.00	R
3.	Co 09004	3.00	MR	7.	CoN 09071	32.00	HS
4.	Co 09005	12.50	MS	8.	CoN 09072	36.50	HS

13							
(II)	Initial Varietal Trial (Midlate)						
1.	Co 09009	32.50	HS	6.	CoN 09073	36.00	HS
2.	Co 09012	33.50	HS	7.	CoN 09074	33.50	HS
3.	Co 09013	35.50	HS	8.	CoSnk 05102	32.25	HS
4.	Co 09014	14.25	MS	9.	CoVSI 09121	36.00	HS
5.	Co 02040	31.75	HS				
(III)	Advanced Varietal Trial- Early I Plant						
1.	Co 08001	8.20	MR	4.	CoN 08071	0.00	R
2.	VSI 08121	0.00	R	5.	PI 08131	32.50	HS
3.	Co 08006	0.00	R				
(IV)	Advanced Varietal Trial- Early II Plant						
1.	Co 07012	4.50	MR	3.	CoN 07071	34.50	HS
2.	Co 07015	7.50	MR	4.	PI 07131	6.00	MR
(V)	Advanced Varietal Trial- Midlate I Plant						
1.	Co 08008	16.50	MS	9.	CoM 08081	0.00	R
2.	Co 08009	4.50	MR	10.	CoN 08072	0.00	R
3.	Co 08016	2.50	MR	11.	CoVC 08061	32.50	HS
4.	Co 08020	0.00	R	12.	Co 08007	3.50	MR
5.	CoSnK 08101	0.00	R	13.	CoVC 08063	12.50	MS
6.	Co 08018	6.25	MR	14.	CoVC 08064	0.00	R
7.	Co 08019	0.00	R	15.	CoVSI 08122	5.00	MR
8.	CoJn 08091	2.50	MR	16.	CoVSI 08123	0.00	R
(VI)	Advanced Varietal Trial- Midlate II Plant						
1.	Co 07006	6.50	MR	4.	Co 07009	0.00	R
2.	Co 07007	0.00	R	5.	Co 07010	8.20	MR
3.	Co 07008	0.00	R				
Standard							
1.	CoN 05071	0.00	R	4.	CoSi 95071	39.12	HS
2.	CoC 671	9.20	MR	5.	Co 6806	0.00	R
3.	Co 86032	9.25	MR	6.	Co 86002	34.50	HS
7.	Co 99004	14.25	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** : 2012-2013
Location: : Navsari
- 4. Test clones** : Entries of AVT -E I & II Plant / AVT -ML I & II Plant/ newly developed clones
- 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, 36 AVT varieties including susceptible check (CoC 671) were evaluated for resistance to wilt in wilt sick plot. Out of 36 AVT varieties, none of the entries showed resistant reaction. Thirteen entries viz., CoN 08071 and PI 08131 (AVT-E I Plant), CoN 07071 and PI 07131 (AVT-E II Plant), Co 08008, Co 08009, Co 08018, CoN 08072, Co 08007, CoVC 08063 and CoVC 08064 (AVT-ML I Plant), Co 07007 and Co 07009 (AVT-ML II Plant) showed moderately resistant reaction. Eight entries depicted moderately susceptible reaction to wilt viz., Co 08006 (AVT-E I Plant), CoSnk 08101, Co 08019, CoJn 08091, CoM 08081 and CoVSI 08122 (AVT-ML I Plant), Co 07006 and Co 07008 (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.

Out of Three other varieties were evaluated for resistance to wilt under wilt sick plot. Among them two entries viz., Co 91017 and Co 99006 showed moderately resistant reaction. While one entry CoVSI 9805 exhibited susceptible reaction to wilt.

Table 4: Evaluation of sugarcane varieties against wilt diseases in wilt sick plot at MSRS, NAU, Navsari 2012-2013

Sr. No.	Variety	Wilt	
		Index	Reaction
(I) Advanced Varietal Trial- Early I Plant			
1.	Co 08001	3.2	S
2.	VSI 08121	3.4	S
3.	Co 08006	2.6	MS
4.	CoN 08071	1.5	MR
5.	PI 08131	1.6	MR
Standard			
1.	Co 85004	1.8	MR
2.	Co 94008	1.7	MR
3.	CoC 671	3.8	S
(II) Advanced Varietal Trial- Early II Plant			
1.	Co 07012	3.4	S
2.	Co 07015	3.6	S
3.	CoN 07071	1.5	MR
4.	PI 07131	1.6	MR
Standard			
1.	Co 99004	1.6	MR
2.	Co 86032	3.4	S
(III) Advanced Varietal Trial- Midlate I Plant			
1.	Co 08008	1.8	MR
2.	Co 08009	1.4	MR
3.	Co 08016	3.6	S
4.	Co 08020	3.3	S
5.	CoSnK 08101	2.4	MS
6.	Co 08018	1.5	MR
7.	Co 08019	2.6	MS
8.	CoIn 08091	2.8	MS
9.	CoM 08081	2.3	MS
10.	CoN 08072	1.4	MR

11.	CoVC 08061	3.4	S
12.	Co 08007	1.6	MR
13.	CoVC 08063	1.8	MR
14.	CoVC 08064	1.6	MR
15.	CoVSI 08122	2.3	MS
16.	CoVSI 08123	3.7	S
17.	CoVC 08062	3.6	S
(IV)	Advanced Varietal Trial- Midlate II Plant		
1.	Co 07006	2.2	MS
2.	Co 07007	1.4	MR
3.	Co 07008	2.6	MS
4.	Co 07009	1.7	MR
5.	Co 07010	3.2	S
(VI)	Other varieties		
1.	Co 91017	1.4	MR
2.	Co 99006	1.6	MR
3.	CoVSI 9805	3.4	S

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 South Saurashtra Region
- 3. Year** : 2012-2013
- 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 eleven sugarcane growing sugar factories area of South Gujarat and South 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 2.10, 2.00 and 5.35 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 variety CoSi 95071 and Co 86002 and it was to the tune of 11 % in Ganesh 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 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. 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)

Sr. No.	Name of disease	Varieties	Location
1.	Wilt	Co 86032, Co 6304, CoC 671, Co 97009, Co 86002, CoSi 95071, Co 86249, FL-2005	Gandevi, Bardoli, Sayan, Kamrej, Narmada, Ganesh, Mahuva, Pandvai, Valsad, Madhi, and Coper
2.	Red rot	CoC 671, Co 86032, Co 86002, Co 92020, Co 6304, CoM 9011	Gandevi, Bardoli, Sayan, Kamrej, Narmada, Ganesh, Mahuva, Pandvai, Valsad, Madhi, and Coper
3.	Whip smut	CoSi 95071, Co 97009, Co 86002, Co 99004, CoN 07071	Gandevi, Bardoli, Sayan, Kamrej, Narmada, Ganesh, Mahuva, Pandvai, Valsad, Madhi, and Coper
4.	Pokkhah boeng	Co 99004	Kamrej and Navsari area.
5.	Grassy shoot	Co 86032	Mahuva and Bardoli area.
6.	Yellow leaf disease	Co 86032, Co 99004	Bardoli sugar factory

PP 22. Survey of naturally occurring Sugarcane disease in Gujarat (2012-13).

Sr No.	Disease	Name of area Surveyed	% disease incidence	Varieties affected
1.	Red rot	Bardoli Sugar factory Dist: Surat	0.05	CoC 671, Co 86032, Co 86002
	Wilt		0.17	CoC 671, Co 86032, Co 86002, Co 86249, Co 8145, FL-2005
	Whip smut		4.67	Co 86002, CoSi 95071, Co 99004,
2.	Red rot	Kamrej Sugar factory Dist: Surat	1.50	Co 86002, Co 86032, CoC 671, CoSi 95071
	Wilt		1.75	Co 86032, Co 86002, CoC 671, FL-2005
	Whip smut		3.68	Co 86002, CoSi 95071, Co 99004, Co 97009
3.	Red rot	Mahuva Sugar Factory Dist: Surat	0.15	CoC 671, Co 86032, Co 86002
	Wilt		0.13	CoC 671, Co 86032, Co 86002
	Whip smut		0.43	Co 86002, CoSi 95071, Co 97009
4.	Red rot	Sayan Sugar Factory Dist: Surat	2.00	CoC 671, Co 86032, Co 86002
	Wilt		1.00	CoC 671, Co 86032, Co 86002
	Whip smut		5.00	Co 86002, CoSi 95071, Co 99004
5.	Red rot	Gandevi Sugar Factory Dist: Navsari	2.48	CoC 671, Co 86032, Co 86002, Co 97009
	Wilt		4.14	CoC 671, Co 86032, Co 86002, Co 97009, CoSi 95071,
	Whip smut		5.19	Co 86002, CoSi 95071, Co 97009
6.	Red rot	Pandvai Sugar Factory Dist: Bharuch	1.08	CoC 671
	Wilt		3.86	CoC 671, Co 86032
	Whip smut		5.45	CoSi 95071
7.	Red rot	Narmada Sugar Factory, Dharikheda, Dist: Narmada	4.16	CoC 671, Co 86032, Co 6304, Co 86002
	Wilt		1.33	CoC 671, Co 86032, Co 86002, Co 6304
	Whip smut		6.79	Co 86002, CoSi 95071
8.	Red rot	Valsad Sugar Factory Dist: Valsad	1.61	CoC 671, Co 97009
	Wilt		1.97	CoC 671, Co 97009
	Whip smut		8.26	CoSi 95071, Co 97009
9.	Red rot	Madhi Sugar Factory Dist: Surat	1.22	Co 86002, Co 86032, Co 92020, Co 9011
	Wilt		2.42	Co 86032, Co 86002
	Whip smut		4.22	Co 86002, Co 97009
10.	Red rot	Ganesh Sugar Factory Dist: Bharuch	5.14	CoC 671, Co 86032, Co 86002
	Wilt		6.10	CoC 671, Co 86002, Co 86032, CoSi 95071
	Whip smut		11.13	CoSi 95071, Co 86002
11.	Red rot	Co-Operative Sugar Factory Dist: Tapi	1.00	CoC 671, Co 86032, Co 86002
	Wilt		2.00	CoSi 95071, Co 86032, Co 86002, Co 86249
	Whip smut		1.40	CoSi 95071, Co 86002

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** : 2012-2013
: **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 58, ISH 100, ISH 287, ISH 12, ISH 41, ISH 147, ISH 128, 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 175, ISH 139, ISH 69 and ISH 103 showed moderately susceptible reaction. Two genotypes viz., ISH 50 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	4.4	MS
2	ISH 175	4.6	MS
3	ISH 139	5.6	MS
4	ISH 58	3.6	MR
5	ISH 100	3.8	MR
6	ISH 287	3.0	MR
7	ISH 12	2.8	MR
8	ISH 50	6.6	S
9	ISH 41	2.8	MR
10	ISH 147	3.0	MR
11	ISH 69	4.8	MS
12	ISH 128	3.7	MR
13	ISH 267	7.6	S
14	ISH 229	3.3	MR
15	ISH 176	3.0	MR
16	ISH 103	4.2	MS
17	ISH 118	3.0	MR
18	ISH 110	3.6	MR
19	ISH 9	8.2	HS
20	ISH 43	8.6	HS
21	ISH 117	3.4	MR
22	ISH 114	3.2	MR
23	SES 594	1.5	R
24	ISH 115	3.4	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 : 2012-2013
: 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 14 genotypes/varieties were tested under pathogen sick conditions in the field. The susceptible variety/genotypes CoC 671, Co 86032, VSI 434 and Co 06020 picked up infections in the field. However Co 09003 and CoVSI 05122 were observed moderately susceptible to red rot but behaved as field tolerant. The field moderately resistant varieties Co 09006, CoN 05071, CoN 07071, CoN 07072, CoN 05072, Co 99004, CoN 08072 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	<i>C. falcatum</i> recovered (Yes/No.)	Any other information
1.	Co 09006	MR	No symptoms observed	-	-
2.	CoC 671	HS	SY(25), SD (30), SM (90), CR (190), CD (210)	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(32), SM(35), CR(120), LS(130), CD(190)	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(230), LD(300), CD (335)	Yes	Disease appears later on all clumps
11.	Co 09003	MS	No symptoms observed	-	-
12.	Co 06020	HS	SY(25), SD(32), SM(35), LS(180), LD(260), CD (240)	Yes	Plant dries and died probably due to wilt disease
13.	CoVSI 05122	MS	No symptoms observed	-	-
14.	Co 05001	MR	No symptoms observed	-	-