

# **AICRP ON SUGARCANE**

**ANNUAL REPORT  
PLANT PATHOLOGY  
2016-2017**

**KERALA AGRICULTURAL UNIVERSITY  
AGRICULTURAL RESEARCH STATION  
THIRUVALLA**



**KERALA AGRICULTURAL UNIVERSITY**  
**SUGARCANE RESEARCH STATION, THIRUVALLA**  
**ANNUAL REPORT FOR 2016-2017**

Project No : PP.14

Title : **Identification of pathotypes of red rot pathogen**

Objective : To gather information on the major pathotypes of red rot pathogen from the different areas /zones.

Location : Peninsular zone - Thiruvalla,  
Sugarcane Research Station, Thiruvalla.

Year of start : 1983-84 (continuing project)

Differential varieties/genotypes : **Co 419** **BO 91**  
**Co 975** **Baragua (*S. Officinarum*)**  
**Co 997** **Kakhai**  
**Co 1148** **SES 594**  
**Co 7717** **CoSc 95422**  
**Co 62399** **CoV92102**  
**CoC 671** **Co7805**  
**CoJ 64** **Co86002**  
**CoS 767** **Co86032**  
**CoS 8436**

No. of isolates : Virulent isolates collected from red rot affected canes of commercially cultivated varieties in the zone.

Method of inoculation : Plug method of inoculation to be done. Inoculations with each isolate to be done on all the varieties with freshly prepared spore suspension. All inoculations to be completed in 2 days by last week of August.

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

Evaluation : The canes are to be split opened longitudinally along the point of inoculation. This is graded of the international scale of 0-9.

Result :

Eight isolates viz., Cf 92012 (Kanjapur), CfPI 1110 (Mathakadi), CfPI 1401 (Kadanganur), CFV 9358, CfPI 1110 (Kothangudi), Cf0323 (Pettavaithalai), Cf91017 (Nellikuppam), CoT1 88322 (New isolate - Madhuri) and along with the designated pathotype for Peninsular zone CF06 and cf94012-0 were inoculated and tested for red rot resistance against nineteen differentials by plug method of artificial inoculation. All the isolates tested exhibited more or less similar reaction to red rot as that of the standard isolates (Table 1) and hence there is no emergence of new pathotype of red rot pathogen in this zone.

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Table. 1. Pathogenic behavior of isolates of red rot pathogen on a set of 19 differentials by plug method (2016-17)

Sl. No	Pathotype/ Isolate	Reaction of host differentials 2016-17																		
		Co 419	Co 975	Co 997	Co 1148	Co 7717	Co 62399	CoC 671	CoJ 64	CoS 767	CoS 8436	BO 91	Baragua	Kakhai	SES 594	CoSc 95422	CoV92102	Co7805	Co86002	Co86032
1	Cf 92012 (Kanjapur)	R	R	R	I	R	I	S	S	I	R	R	R	R	R	I	R	S	R	R
2	Cf PI 1110 (Mathakadi)	I	I	I	I	I	R	S	I	S	I	I	R	I	R	I	R	I	I	I
3	Cf PI 1401 (Kadanganur)	R	R	I	I	I	I	I	I	I	R	R	R	I	R	I	I	I	R	I
4	CFV 9358	I	I	S	I	I	S	S	S	I	R	I	I	I	I	I	S	I	R	R
5	Cf PI 1110 (Kothangudi)	I	R	S	R	S	I	S	S	I	R	R	I	I	R	I	I	I	R	R
6	Cf 0323 (Pettavaithalai)	R	R	I	I	I	I	I	S	I	R	R	R	I	R	I	I	I	R	R
7	Cf91017 (Nellikuppam)	R	R	I	R	S	I	S	I	I	R	I	R	I	R	I	I	I	R	R
8	CoTI 88322 (New isolate)	I	I	I	I	I	S	S	S	R	R	R	R	I	R	R	I	I	I	I
9	CF06	I	I	S	I	R	I	S	I	R	R	R	R	R	R	R	I	R	I	I
10	Cf 94012-O	I	I	S	I	I	S	S	I	I	R	I	R	I	R	R	I	I	I	I

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**SUGARCANE RESEARCH STATION, THIRUVALLA**

**ANNUAL REPORT FOR 2016-17**

1. Project No : PP.17
2. Title : **Evaluation of zonal varieties for resistance to red rot**
3. Objectives : To gather information on the relative resistance to red rot of the entries in zonal varietal trials of the respective zones
4. Technical programme :
  - a. Varieties/genotypes : All the centers will test all the entries of early and mid late genotypes under IVT and AVT of the respective zone
  - b. Inoculum : Isolates chosen will be only from local red rot collection
  - c. Method of inoculation : Plug and cotton swab methods of inoculation to be done in the fortnight of August to first week of September when 6 to 7 well formed internodes are formed
  - d. Observation : One observation at the 60<sup>th</sup> day of inoculation. The canes are split opened longitudinally along the point of inoculation. This is graded on the international scale of 0-9
5. Evaluation (Results) :

**I. INITIAL VARIETAL TRIALS**

All the entries in the IVT (Early), IVT (Mid late) were inoculated by plug and cotton swab methods of inoculation with the standard isolates CF06 and cf94012-0 of red rot pathogen and observations were recorded 60 days after inoculation (Table 1).

**(a) Initial Varietal Trial (Early)**

Out of the 11 entries tested in the IVT (Early) trial with the standard isolate CF06, three varieties *viz.*, Co 13002, CoSnk 13101 and MS 13081 showed resistant (R) reaction, six varieties *viz.*, Co 13003, Co 13004, CoN 13072, CoSnk 13102, Co 85004 and Co 94008 showed moderate resistance (MR) reaction, one variety *viz.*, CoN 13071 showed moderate susceptibility (MS) reaction and one variety *viz.*, CoC 671 showed susceptible (S) reaction to plug method of inoculation. In cotton swab method of inoculation, all the entries showed resistant reaction to CF06.

Out of the 11 entries tested in the IVT (Early) trial with the standard isolate cf94012-0, one variety *viz.*, Co13003 showed resistant (R) reaction, eight varieties *viz.*, Co13002, Co13004, CoN 13071, CoN 13072, CoSnk13101, MS 13081, Co 85004 and Co 94008 showed moderate resistance (MR) reaction, two varieties *viz.*, CoSnk13102 and CoC 671 showed moderate susceptibility (MS) reaction to plug method of inoculation.

All the varieties except one variety *viz.*, CoSnk13102 showed resistant reaction to cf94012-0 in cotton swab method of inoculation.

**(b) Initial Varietal Trial (Mid late)**

Out of the 22 entries tested in the IVT (midlate) trial with the standard isolate CFO6, three varieties *viz.*, Co 13005, Co 13011 and P1 13132 showed resistant (R) reaction, fifteen varieties *viz.*, Co 13008, Co 13009, Co 13013, Co 13014, Co 13016, Co 13018, Co 13020, CoM 13082, CoN 13073, CoN 13074, CoSnk 13104, CoSnk 13105, CoSnk 13106, CoT 13366 and Co 99004 showed moderate resistance (MR) reaction, three varieties *viz.*, CoSnk 13103, P1 13131 and Co 86032 showed moderate susceptibility (MS) reaction, one variety *viz.*, Co 13006 showed susceptible (S) reaction to plug method of inoculation.

In cotton swab method of inoculation, all varieties showed resistant reaction except two varieties *viz.*, Co 13006 and CoSnk 13103 which showed susceptible reaction against CFO6.

Out of the 22 entries tested in the IVT (midlate) trial with the standard isolate cf94012-0, 10 varieties *viz.*, Co 13005, Co 13008, Co 13009, Co 13011, Co 13013, CoM 13082, CoN 13073, CoSnk 13104, CoT 13366 and P1 13132 showed resistance (R) reaction, nine varieties *viz.*, Co 13006, Co 13014, Co 13020, CoN 13074, CoSnk 13103, CoSnk 13105, CoSnk 13106, P1 13131 and Co86032 showed moderate resistance (MR) reaction, one variety *viz.*, Co 99004 showed moderate susceptibility (MS) reaction, two varieties *viz.*, Co 13016 and Co 13018 showed susceptible (S) reaction to plug method of inoculation.

All the varieties except one variety viz., Co 13016 showed resistant reaction to cf94012-0 in cotton swab method of inoculation

## **(II) Advanced Varietal Trials**

All the entries in the AVT (Early I Plant, II plant & Midlate I plant, II plant) were inoculated with the standard isolate CF06 and cf94012-0 by plug and cotton swab methods of inoculation and observations were recorded 60 days after inoculation (Table 2).

### **II (a) Advance Varietal Trial (Early) I Plant**

Out of the eight entries tested in the AVT (Early I Plant) with the standard isolate CFO6, five varieties viz., Co 11001, Co 11004, CoM 11081, Co 85004 and Co 94008 showed moderately resistance (MR) reaction, two varieties viz., CoM 11082 and CoM 11084 exhibited moderately susceptible (MS) reaction, one variety viz., CoC 671 showed susceptible reaction to plug method of inoculation. In cotton swab method of inoculation, all varieties except CoC 671 showed resistant reaction against CF06.

Out of the eight entries tested in the AVT (Early I Plant) with the standard isolate cf94012-0, three varieties viz., Co 11004, Co 85004 and Co 94008 showed moderately resistance (MR) reaction, three varieties viz., Co 11001, CoM 11081 and CoM 11082 exhibited moderately susceptible (MS) reaction, two varieties viz., CoM 11084 and CoC 671 showed susceptible reaction to plug method of inoculation.

All the varieties except two varieties viz., CoM 11084, CoC 671 showed resistant reaction to cf94012-0 in cotton swab method of inoculation.

### **II (b) Advance Varietal Trial (Early) II Plant**

Out of the eleven entries tested in the AVT (Early II Plant) with the standard isolate CFO6, three varieties viz., Co 10024, CoT 10366 and CoT 10367 showed resistance (R) reaction, seven varieties viz., Co10004, Co10005, Co10006, Co10026, Co 10027, Co 85004 and Co 94008 exhibited moderately resistant (MR) reaction and one variety viz., CoC 671 showed susceptible reaction in plug method of inoculation. In cotton swab method of inoculation, all varieties except CoC 671 showed resistant reaction to CF06.

Out of the eleven entries tested in the AVT (Early II Plant) with the standard isolate cf94012-0, nine varieties viz., Co 10004, Co 10005, Co 10006, Co 10024, Co 10027, CoT 10366, CoT 10367, Co 85004, and Co 94008 showed moderate resistance (MR) reaction, one variety viz., Co10026 exhibited moderately susceptible (MS) reaction and one variety viz., CoC 671 showed susceptible reaction to plug method of inoculation.

All the varieties except two varieties viz., Co10026 and CoC 671 showed resistant reaction to cf94012-0 in cotton swab method of inoculation.

### **II (c) Advanced Varietal Trial (AVT) : Midlate I plant**

Out of the eight entries tested in the AVT midlate I Plant with the standard isolate CFO6, one variety viz., Co 99004 showed resistance (R) reaction, six varieties viz., Co 11005, Co 11007, Co 11012, CoM 11086 and Co 86032 exhibited moderately resistant (MR) reaction, one variety viz., Co 11019 showed moderate susceptible (MS) reaction and one variety viz., CoM 11085 showed susceptible (S) reaction to plug method of inoculation. All varieties exhibited resistant reaction against CF06 in cotton swab method of inoculation.

Out of the eight entries tested in the AVT midlate I Plant with the standard isolate cf94012-0, six varieties viz., Co 11005, Co 11007, Co 11012, Co 11019, CoM 11086 and Co 86032 exhibited moderately resistant (MR) reaction, one variety viz., CoM 11085 showed moderate susceptible (MS) reaction to plug method of inoculation. All varieties exhibited resistant reaction to cf94012-0 in cotton swab method of inoculation.

### **II (d) Advanced Varietal Trial (AVT) : Midlate II plant**

Out of the thirteen entries tested in the AVT midlate II Plant with the standard isolate CFO6, two varieties viz., PI 10131 and Co 99004 showed resistance (R) reaction, ten varieties viz., Co 09009, Co 10015, Co 10017, Co 10031, Co 10033, CoT 10368, CoT 10369, CoVc 10061, PI 10132 and Co 86032 exhibited moderately resistant (MR) reaction and one variety viz., CoM 10083 showed moderate susceptible (MS) reaction to plug method of inoculation. All varieties exhibited resistant reaction to CF06 in cotton swab method of inoculation.

Out of the thirteen entries tested in the AVT midlate II Plant with the standard isolate cf94012-0, two varieties viz., CoVc 10061 and Co 99004 showed resistance (R) reaction, six varieties viz., Co 09009, Co 10015, Co 10033, CoT 10368, PI 10131, and Co 86032 exhibited moderately resistant (MR) reaction and three varieties viz., Co 10017, Co 10031 and CoT 10369 showed moderate susceptible (MS) reaction and two varieties viz., CoM 10083 and PI 10132 showed susceptible (S) reaction to plug method of inoculation. All varieties except Co 10017 exhibited resistant reaction to cf94012-0 in cotton swab method of inoculation.

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## Evaluation of Zonal varieties/genotypes for resistance to red rot disease (2016-17)

Location: Sugarcane Research Station, Thiruvalla

**Table 1. Initial Varietal Trial (IVT) : Early and Midlate**

<b>I (a). Initial Varietal Trial (IVT) : Early</b>							
<b>Sl. No</b>	<b>Genotypes</b>	<b>CF06</b>			<b>cf94012-0</b>		
		<b>Plug method</b>		<b>Cotton Swab method</b>	<b>Plug method</b>		<b>Cotton Swab method</b>
		<b>Score</b>	<b>Reaction</b>	<b>Reaction</b>	<b>Score</b>	<b>Reaction</b>	<b>Reaction</b>
1	Co13002	2	R	R	3	MR	R
2	Co13003	2.3	MR	R	2	R	R
3	Co13004	3.6	MR	R	4	MR	R
4	CoN 13071	4.6	MS	R	2.6	MR	R
5	CoN 13072	3	MR	R	3	MR	R
6	CoSnk13101	2	R	R	2.3	MR	R
7	CoSnk13102	3.3	MR	R	5.6	MS	S
8	MS 13081	2	R	R	3	MR	R
9	Co 85004	2.3	MR	R	2.3	MR	R
10	Co 94008	3.5	MR	R	2.5	MR	R
11	CoC 671	6.6	S	R	5.3	MS	R
<b>I (b). Initial Varietal Trial (IVT) : Midlate</b>							
<b>Sl. No</b>	<b>Genotypes</b>	<b>CF06</b>			<b>cf94012-0</b>		
		<b>Plug method</b>		<b>Cotton Swab method</b>	<b>Plug method</b>		<b>Cotton Swab method</b>
		<b>Score</b>	<b>Reaction</b>	<b>Reaction</b>	<b>Score</b>	<b>Reaction</b>	<b>Reaction</b>
1	Co 13005	2	R	R	2	R	R
2	Co 13006	7	S	S	3	MR	R
3	Co 13008	2.3	MR	R	2	R	R
4	Co13009	3.3	MR	R	2	R	R

5	Co 13011	2	R	R	2	R	R
6	Co 13013	2.3	MR	R	2	R	R
7	Co 13014	2.6	MR	R	3	MR	R
8	Co 13016	2.3	MR	R	6.3	S	S
9	Co 13018	3	MR	R	6.6	S	R
10	Co 13020	2.3	MR	R	2.6	MR	R
11	CoM 13082	2.3	MR	R	2	R	R
12	CoN 13073	2.6	MR	R	2	R	R
13	CoN 13074	3	MR	R	2.6	MR	R
14	CoSnk13103	4.6	MS	S	2.3	MR	R
15	CoSnk13104	3.6	MR	R	2	R	R
16	CoSnk13105	3	MR	R	2.6	MR	R
17	CoSnk13106	3	MR	R	2.6	MR	R
18	CoT 13366	2.3	MR	R	2	R	R
19	PI 13131	6	MS	R	3.3	MR	R
20	PI 13132	2	R	R	2	R	R
21	Co 86032	4.3	MS	R	3	MR	R
22	Co 99004	3.3	MR	R	5	MS	R

**Table 2. Advanced Varietal Trial (AVT) : Early and Midlate (I plant and II plant)**

<b>II (a). Advanced Varietal Trial (AVT) : Early I plant</b>							
<b>Sl. No</b>	<b>Genotypes</b>	<b>CF06</b>			<b>cf94012-0</b>		
		<b>Plug method</b>		<b>Cotton Swab method</b>	<b>Plug method</b>		<b>Cotton Swab method</b>
		<b>Score</b>	<b>Reaction</b>	<b>Reaction</b>	<b>Score</b>	<b>Reaction</b>	<b>Reaction</b>
1	Co 11001	4	MR	R	5.6	MS	R
2	Co 11004	4	MR	R	2.3	MR	R
3	CoM 11081	3.6	MR	R	5	MS	R
4	CoM 11082	4.6	MS	R	5.6	MS	R

5	CoM 11084	5.6	MS	R	7.3	S	S
6	Co 85004	3.3	MR	R	3	MR	R
7	Co 94008	2.6	MR	R	3.6	MR	R
8	CoC 671	7.3	S	S	8	S	S

**II (b). Advanced Varietal Trial (AVT) : Early II plant**

Sl. No	Genotypes	CF06			cf94012-0		
		Plug method		Cotton Swab method	Plug method		Cotton Swab method
		Score	Reaction	Reaction	Score	Reaction	Reaction
1	Co 10004	3.3	MR	R	3.3	MR	R
2	Co 10005	4	MR	R	2.5	MR	R
3	Co 10006	2.6	MR	R	2.3	MR	R
4	Co 10024	2	R	R	4	MR	R
5	Co 10026	2.6	MR	R	4.6	MS	S
6	Co 10027	2.6	MR	R	2.3	MR	R
7	CoT 10366	2	R	R	3.3	MR	R
8	CoT 10367	2	R	R	3	MR	R
9	Co 85004	3.3	MR	R	3	MR	R
10	Co 94008	2.6	MR	R	3.6	MR	R
11	CoC 671	7.3	S	S	8	S	S

**II (c). Advanced Varietal Trial (AVT) : Midlate I plant**

Sl. No	Genotypes	CF06			cf94012-0		
		Plug method		Cotton Swab method	Plug method		Cotton Swab method
		Score	Reaction	Reaction	Score	Reaction	Reaction
1	Co 11005	4	MR	R	3.6	MR	R
2	Co 11007	3.3	MR	R	2.6	MR	R
3	Co 11012	3.6	MR	R	4	MR	R
4	Co 11019	4.3	MS	R	3.6	MR	R

5	CoM 11085	7.3	S	R	5.6	MS	R
6	CoM 11086	4	MR	R	4	MR	R
7	Co 86032	3.6	MR	R	3.3	MR	R
8	Co 99004	2	R	R	2	R	R

**II (d). Advanced Varietal Trial (AVT) : Midlate II plant**

Sl. No	Genotypes	CF06			cf94012-0		
		Plug method		Cotton Swab method	Plug method		Cotton Swab method
		Score	Reaction	Reaction	Score	Reaction	Reaction
1	Co 09009	3.3	MR	R	3.3	MR	R
2	Co 10015	2.3	MR	R	3	MR	R
3	Co 10017	3.3	MR	R	4.3	MS	S
4	Co 10031	2.6	MR	R	4.6	MS	R
5	Co 10033	2.6	MR	R	3.3	MR	R
6	CoM 10083	5.3	MS	R	6.3	S	R
7	CoT 10368	2.3	MR	R	3.3	MR	R
8	CoT 10369	3.3	MR	R	6	MS	R
9	CoVC10061	3	MR	R	2	R	R
10	PI 10131	2	R	R	3.3	MR	R
11	PI 10132	4	MR	R	7	S	R
12	Co 86032	3.6	MR	R	3.3	MR	R
13	Co 99004	2	R	R	2	R	R

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**SUGARCANE RESEARCH STATION, THIRUVALLA**  
**ANNUAL REPORT FOR 2016-17**

1. Project No : P.P.22
2. Title : **Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties**
3. Objective : To gather information on the diseases naturally occurring in the area on varieties for compiling an all India disease status report yearly
4. Location : Peninsular zone-Thiruvalla  
Sugarcane Research Station, Thiruvalla
5. Year of start : 1989-90
6. Technical programme : Survey will be conducted in the sugarcane growing areas and to take periodic observations in June, September and December in all locations to gather information on the per cent incidence of diseases on all varieties of the area (General survey)
7. Phase to be covered during the survey : Survey of major diseases occurring in the area on important varieties and their identification period
8. Result : (1) **Pokkah Boeng:** This disease has been observed in most of the varieties cultivated. The disease incidence was observed during the south west monsoon period of May - June. The diseased plants produced twisting and yellowing symptom in young leaves, and also infected young leaves get converted to twine like structure and tied to main shoot. Stunting of plants was also noticed. But fortunately, all the affected plants are recovered after the monsoon showers.  
(2) **Sheath blight:** Sheath blight due to *Rhizoctonia solani* was observed in the entire experimental field in the station during May – June. The sheath blight symptom was observed in the leaves and leaf sheath. Sclerotia were also produced in the field. Proper field sanitation and detrashing at regular interval for two to three times reduced the incidence of this disease.  
(3) **Foliar diseases**  
(a) **Ring spot:** This disease was the most common and predominant foliar disease observed even from two months age up to harvest. But proper field sanitation and

detrashing at regular interval for two to three times reduced the incidence of this disease.

**(b) Rust:** Rust disease was observed during August – September months. Uredospores were observed as light orange pustules on leaf lamina during the month of August. The teliospores were observed as black raised pustules during September. The severely affected leaves got dried up. But the disease subsided with the onset of North East monsoon showers.

**(4) Mosaic:** Mosaic was seen commonly in most of the crop varieties, but the disease was not in such a stage to cause any severe yield reduction.

**(5) Grassy shoot:** This disease was not observed commonly.

## 9. Discussion and summary

In the current year (2016–17), the most predominant disease was the foliar disease *viz.*, ring spot and sheath blight. But they were not found in such a severe form to cause any drastic yield loss. Proper field sanitation and detrashing for 2-3 times controlled the disease. The other diseases observed were rust, mosaic and Pokkah Boeng. But none of the diseases were in a severe stage to cause any drastic yield decline.

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Table 1. Survey of naturally occurring sugarcane diseases (2016-17)

SI. No	Disease	Name of area surveyed	% Disease incidence	Crop stage	Any other information
1.	Smut	Disease not present in any area	-	-	-
2.	Wilt	Disease not present in any area	-	-	-
3.	RSD	Disease not present in any area	-	-	-
4.	YLD	Disease not present in any area	-	-	-
6.	Foliar diseases				
(a)	Ring spot	Marayoor (Idukki district), Iramalikkara, Pandanadu and Prayar (Alleppey district) and Nariyapuram, Pandalam, Vallamkulam, Niranam, Nedumbram and Venpala (Pathanamthitta district).	Moderate	2 month onwards	Associated with almost all varieties till harvest
(b)	Sheath blight (R solani)	Thiruvanmandoor and Iramalikkara (Alleppey district) and Nariyapuram, Pandalam, Niranam, Nedumbram and Venpala (Pathanamthitta district)	Mild	4 months	
7.	Other diseases				
(a)	Pokkah Boeng	Nedumbram and Venpala, (Pathanamthitta district), Thiruvanmandoor and Iramalikkara (Alleppey	Mild	4-6 month	The disease appeared during the month of May and disappeared after

		district)			the shower during July-August
(b)	Rust	Marayoor (Idukki district) Iramallikkara, Pandanadu and Prayar (Alleppey district), Nariyapuram, Pandalam, Vallamkulam, Niranam, Nedumbram and Venpala (Pathanamthitta district)	Mild	5-6 month	The disease appeared during the month of August. Uredospores and teliospores are found to arise. The disease subsided with the onset of monsoon.

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