

ANNUAL REPORT FOR THE YEAR 2013-14
All India Coordinated Research Project on Sugarcane



DIVISION OF PLANT PATHOLOGY

REGIONAL AGRICULTURAL RESEARCH STATION, ANAKAPALLE

ACHARYA N G RANGA AGRICULTURAL UNIVERSITY

PLANT PATHOLOGY DISCIPLINE

Regional Agricultural Research Station, Anakapalle experiments conducted under All India Coordinated Research Project on Sugarcane during 2013-2014

<u>S. No</u>	<u>Project No</u>	<u>Project title</u>
1	PP14 & 14(a)	Identification of pathotypes in red rot pathogen and maintenance of isolates of red rot pathogen
2	PP 17 (a)	Evaluation of zonal varieties for resistance to red rot
3	PP 17 (b)	Evaluation of zonal varieties for resistance to smut.
4	PP 17 (c)	Evaluation of zonal varieties for resistance to wilt.
5	PP 22	Survey of sugarcane diseases occurring in the area on important sugarcane varieties
6	PP 23	Assessment of elite and ISH genotypes for resistance to red rot.
7	PP 30	Assessment of field resistance in sugarcane to red rot
8	PP 31	Screening, epidemiology and management of top rot in sugarcane.
9	PP 28 (a)	Management of rust of sugarcane
10	PP 28 (b)	Methodology for screening sugarcane genotypes for resistance to brown rust (<i>Puccinia melanocephala</i>)

ANNUAL REPORT FOR THE YEAR 2013-14
All India Coordinated Research Project on Sugarcane

Plant Pathology

- I. **Project No.** : PP 14
- II. **Project title** : Identification of pathotypes / races in red rot pathogen
- III. **Serial number of the year of experimentation:** 31
- IV. **Location** : Regional Agricultural Research Station, Anakapalle
- V. **Objectives, results of past years and future line of work:**

This experiment is conducted with an objective to gather information on the major pathotypes of red rot pathogen from different areas / Zones. The study conducted from 1983-84 to 2012-13 indicated the existence of four distinct pathotypes in red rot fungus viz., Cf 04 (CO 419) Cf 05 (Co 997), Cf 06 (Co C 671) and Cf 10 (85 A 261) in coastal Andhra Pradesh.

VI. **Technical programme of work on which the report is based:**

The technical programme of work for the year 2013-14 was discussed and finalized during 30th biannual workshop of AICRP on sugarcane held at TNAU, Coimbatore in October, 2012.

VII **Discipline wise technical report:**

a. **Isolates of red rot fungus used for inoculations:**

S.No.	Variety from which isolate was collected	Year of collection	Place of collection
1	Co 419	1989	Anakapalle (Rejuvenated in July, 2012)
2	Co C 671	2011	SBI, Coimbatore (Rejuvenated in July, 2012)
3	Co 997	2011	SBI, Coimbatore (Rejuvenated in July, 2012)
4	85 A 261 (CoA 89085)	1997	Nellore (Rejuvenated in July, 2012)
5	S-16	2011	Podalakuru (Nellore Dt) (Rejuvenated in July, 2013)
6	81 V 48	2013	Yerravaram (East Godavari Dt)
7	81 A 99	2013	Chuchukonda (Visakhapatnam Dt.)
8	Co 6030	2013	Elaswaram (East Godavari Dt.)

b. **Date of Planting** : February 2013

c. **Varieties (14)** : Baragua (*Saacharum officinarum*), Khakai (*S. sinense*) Co 419, Co 997, Co C 671, Co 975, Co 1148, Co 7717, B091, Co 62399, Co S 767, Co J 64, Co S 8436 and SES 594.

- d. **Fertilizer application** : 112, 100 and 120 kg N, P₂O₅ and K₂O / ha respectively. Entire P₂O₅ and K₂O were applied as basal dose. N fertilizer (Urea) was applied two equal splits at 45 and 90 days after planting.
- e. **Irrigations** : 12-15 irrigations were given during the crop growth period.
- f. **Plant Protection** : --
- g. **Date of inoculation** : 22.09.2013
- h. **Plot size** : 2.5 m x 0.8 m x 18 rows = 36 sq.m / variety
- i. **Design** : Single series
- j. **Replications** : Non – replicated
- k. **Method of inoculation** : Plug method
- l. **Name and designation of the participating Scientist :**

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Sri M. Suresh, Scientist (Plant Pathology)
3. Dr. K. Prasada Rao, Principal Scientist (Sugarcane)

m. **Results recorded during the previous year:**

The experiment conducted during 2012-13 with eight red rot isolates indicated the existence of four distinct pathotypes of red rot fungus viz., Cf 419 (Cf 04), Cf 671 (Cf 06), Cf 997 (Cf 05) and Cf 261 (Cf 10) in coastal Andhra Pradesh.

n. **Results obtained during this year**

Observations for the extent of disease spread in each variety – isolate combination was recorded at 60 days after inoculation. For assessing the virulence of each isolate, about 30 standing canes were sampled in each variety. The canes were examined for external symptoms of the disease like yellowing or drying of tops. Later, the canes were split opened longitudinally and scored for internal characters of the disease like lesion width, white spots and extent of nodal transgression. Based on the disease (host reaction), the varieties were classified into three groups viz., Resistant (R), Susceptible (S) and intermediate (I) as follows.

R: Lesion width laterally restricted, nodal transgression up to two nodes, white spots, rind infection, sporulation over the rind and yellowing and drying of tops absent.

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

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

The data (Table-1) revealed that the isolates collected from Co 419 (Anakapalle), Co C 671 (Vuyyuru), Co 997 (Anakapalle) and 85 A 261 (Co A 89085) (Nellore) are distinctly different in their virulence pattern on the differential varieties and hence are considered as distinct pathotypes viz., Cf 04, Cf 06, Cf 05 and Cf 10 respectively. Variety – isolate interaction revealed that the isolates from 81 V 48 and c0 6030 are similar to Cf 419 (Cf 04), the isolates from S-16 is similar to Cf 671 (Cf 06) and 81 A 99 is similar to Co 997 (Cf 05). The results of the present study clearly indicate the existence of four distinct pathotypes in red rot fungus viz., Cf 04, Cf 06, Cf 05 and Cf 10.

VIII **Technical summary of the individual report:**

Eight isolates of red rot fungus collected from Co 419, Co C 671, Co 997, 85 A 261 (Co A 89085), Co 6030, S- 16, 81 V 48 and 81 A 99 were tested on a set of 14 differential varieties during 2013-14. Variety – isolate interaction revealed that the isolates from 81 V 48 and c0 6030 are similar to Cf 419 (Cf 04), the isolates from S-16 is similar to Cf 671 (Cf 06) and 81 A 99 is similar to Co 997 (Cf 05). Thus, the present study confirmed the existence of four red rot pathotypes in Andhra Pradesh.

The virulence pattern of four isolates (CO 419, Co C 671, Co 997 and 85 A 261) on differentials indicated the existence of four distinct pathotypes viz., Cf 419 (Cf 04), Cf 671 (Cf –06), Cf 997 (Cf 05) and Cf 261 (Cf 10) in coastal Andhra Pradesh.

IX. **Salient findings:**

The present study clearly indicated the existence of four distinct pathotypes of red rot fungus viz., Cf 04, Cf 06, Cf 05 and Cf 10 in Coastal Andhra Pradesh.

Table 1: Reaction of sugarcane varieties to different isolates of red rot fungus by plug method 60 days after inoculation (2013-14)

Sl.No	Pathotype/ Isolate	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	Kakhai	SES 594
1	CF 04	Co 419	S	S	S	R	R	S	S	S	R	R	R	R	R	R
2	CF 05	Co 997	R	S	S	R	R	R	S	S	R	R	R	R	R	R
3	CF 06	CoC 671	R	S	S	I	R	S	S	S	R	R	R	R	R	R
4	CF 10	CoA 89085	S	S	S	R	R	S	S	S	R	R	R	R	I	R
5	New isolate-1	S-16	S	S	S	I	R	S	S	S	R	R	R	R	I	R
6	New isolate-2	81 V 48	S	I	S	S	R	S	S	I	R	R	R	R	R	R
7	New isolate-3	81A 99	I	S	S	R	R	R	S	S	R	R	R	R	R	R
8	New isolate-4	Co 6030	S	I	S	S	R	R	S	S	R	R	R	R	R	R

R: Resistant

I: Intermediate

S: Susceptible

- I **Project No.** : PP 17 (a)
- II **Project title** : Evaluation of Zonal varieties for resistance to red rot
- III. **Serial number of the year of experimentation:** 26
- IV. **Location** : Regional Agricultural Research Station, Anakapalle
- V. **Objectives, results of past years and future line of work:**

This experiment is being conducted every year to obtain information on relative resistance of varieties included in Zonal varietal trial. During 2012-13, twenty four entries / genotypes tested for their reaction to two pathotypes (Cf 04, Cf 06 and Cf 05) of red rot fungus individually and as a mixture by nodal and plug method of inoculation.

During 2010-11 out of 24 varieties / genotypes tested by plug method of inoculation four entries (Co A 7321, Co C 07336, Co C 07337 and Co 086249) showed resistance while 4 entries Co Or 08346, Co A 06321, Co 06030 and Co V 92102 showed moderately resistant reaction to Cf 04, Cf 06 and mixture of both. Out of 24 entries tested, four entries reacted as resistant, 4 as moderately resistant and 16 as highly susceptible to Cf 04 and Cf 06.

Out of 26 varieties / genotypes tested during 2011-12 by nodal method only four entries (Co A 08321(Co A 08322), CoC 6030 and Co c01061) manifested top drying indicating their nodal susceptibility. In the plug method out of 25 entries, five entries (CoA 07321 (2000A56), CoC07336, CoC07337, Co086249 and CoV 92102) showed resistance while 3 entries CoA 06321 (2001A63), Co Or 08346 and Co 06030 showed moderately resistant reaction to Cf 04, Cf 05 and Cf 06.

VI **Technical programme on which the report is based:**

The technical programme of work for the year 2013-14 was discussed and finalized during 30th biannual workshop of AICRP on sugarcane held at TNAU, Coimbatore in October, 2012.

VII. **Discipline wise technical report**

- a. **Date of planting** : March 2013
- b. **Varieties (20)** : Co 997, Co C 671, Co 419, Co A 12321 (2006 A 64), Co A 12322 (2006 A 102), Co A 12323 (2006 A 223), Co A 12324 (2007 A 177) , Co A 11321 (2005 A 128), Co A 11323(2000 A 240), Co A 11324 (2004 A 128), Co A 11325 (2005 A 108), Co A 11326 (2005 A 122), Co Or 11322, Co C 10336, Co C 11336, Co Or 10346, Co A 7219, CO 7706, Co A 92081 (87 A 298), Co 86249.
- c. **Fertilizer application** : 112, 100 and 120 kg N, P₂O₅ and K₂O / ha respectively. Entire P₂O₅ and K₂O were applied as basal dose. N fertilizer (Urea) was applied two equal splits at 45 and 90 days after planting.
- d. **Irrigations** : 12-15 irrigations were given during the crop growth period.

- e. **Plant protection** : --
- f. **Date of inoculations** :
- 1. **Nodal cotton swab method** : September 2013
- 2. **Plug method** : September 2013
- g. **Plot size** : 10 m x 0.8 x 2 rows = 16 sq.m / variety`
- h. **Design** : Single series
- i. **Replications** : Non – replicated
- j. **Dates of harvesting** : November, 2013
- 1. **Cotton swab method** : November 2013
- 2. **Plug method** : November 2013

k. **Name and designation of the participating scientist:**

- 1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
- 2. Sri M. Suresh, Scientist (Plant Pathology)
- 3. Dr. K. Prasada Rao, Principal Scientist (Sugarcane)

l. **Results recorded during the previous year:**

Out of 24 varieties / genotypes tested during 2012-13 by nodal only four entries (Co V 09356, Co c01061, Co 86249 and CoA 11322) manifested top drying indicating its susceptibility and the remaining 20 entries reacted as resistant to Cf 04, Cf 05 and Cf 06. In the plug method out of 24 varieties / genotypes tested by plug method of inoculation six entries (COC 08336, COA 92081, COA 10321, CO Or 10346, CO 87043 and COC 10336) showed resistance while 4 entries COV 92102, COA 11323, COA 11326 and COSi 96071 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05. Out of 25 entries tested, 5 entries reacted as resistant, 3 as moderately resistant and 16 as highly susceptible to Cf 04, Cf 05 and Cf 06.

m. **Results obtained during this year:**

1. **Cotton swab method:**

Observations for the incidence of nodal infection and internal spread in each variety / genotype was recorded at 60 days after inoculation and the results are presented in Table –3.

It is evident from the results (Table-3) that out of 20 entries tested, only five entries manifested top drying indicating its susceptibility and the remaining 15 entries reacted as resistant to Cf 04, Cf 05 and Cf 06.

2. Plug method:

Observations on external and internal symptoms were recorded at 60 days after inoculation. Thirty inoculated canes were sampled in each entry for assessing the host reaction. Canes were observed for external symptoms like yellowing or drying of tops. Later, the canes were split opened longitudinally and recorded for internal characteristics of the disease like lesion width, white spots and extent of nodal transgression. Based on the average score of above four characters, reaction of the varieties / genotypes were graded on 0-9 scale and the data are presented in Table – 2.

Results presented in table – 2 revealed that out of 20 varieties / genotypes tested by plug method of inoculation seven entries (Co A 12321, Co A 12322, Co A 12324, Co A 11321, Co A 11324, Co C 11336 and Co A 92081) showed resistance while 3 entries Co A 11323, Co A 11326 and Co C 10336 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05. Whereas in cotton swab method, out of 20 entries tested, only five entries (Co 419, Co C 671, Co 671, Co 7219 and Co 86249) manifested top drying indicating its susceptibility and the remaining 15 entries reacted as resistant (Table-3).

VIII Technical programme of the year next to the reporting year:

This experiment is being continued during 2014-15.

IX. Technical summary of the individual report:

Twenty varieties / genotypes were tested for their reaction to three pathotypes (Cf 04, Cf 05 and Cf 06) of red rot fungus individually by cotton swab and plug method of inoculation. In the cotton swab method, out of 20 entries tested, only five entries (Co 419, Co C 671, Co 671, Co 7219 and Co 86249) manifested top drying indicating its susceptibility and the remaining 15 entries reacted as resistant. Out of 20 varieties / genotypes tested by plug method of inoculation seven entries (Co A 12321, Co A 12322, Co A 12324, Co A 11321, Co A 11324, Co C 11336 and Co A 92081) showed resistance while 3 entries Co A 11323, Co A 11326 and Co C 10336 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05.

X. Salient findings:

Twenty varieties / genotypes were tested for their reaction to three pathotypes (Cf 04, Cf 05 and Cf 06) of red rot fungus individually by cotton swab and plug method of inoculation. In the cotton swab method, out of 20 entries tested, only five entries (Co 419, Co C 671, Co 671, Co 7219 and Co 86249) manifested top drying indicating its susceptibility and the remaining 15 entries reacted as resistant. Out of 20 varieties / genotypes tested by plug method of inoculation seven entries (Co A 12321, Co A 12322, Co A 12324, Co A 11321, Co A 11324, Co C 11336 and Co A 92081) showed resistance while 3 entries Co A 11323, Co A 11326 and Co C 10336 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05.

Table 2: Reaction of varieties / genotypes to three pathotypes of red rot fungus in Plug method at 60 days after inoculation (2013-2014)

S.No	Clone	Pathotypes of red rot fungus					
		Cf 04		Cf 06		Cf 05	
		Score on 0-9 scale	Reaction	Score on 0-9 scale	Reaction	Score on 0-9 scale	Reaction
1.	Co 997	8.7	HS	8.9	HS	8.9	HS
2.	Co C 671	8.5	HS	8.8	HS	8.4	HS
3	Co 419	8.8	HS	8.5	HS	8.4	HS
4	Co A 12321 (2006 A 64)	2.0	R	1.9	R	3.2	MR
5	Co A 12322 (2006 A 102)	1.8	R	2.0	R	1.9	R
6	Co A 12323 (2006 A 223)	8.4	HS	8.8	HS	8.2	HS
7	Co A 12324 (2007 A 177)	2.0	R	3.4	MR	1.8	R
8	Co A 11321 (2005 A 128)	1.8	R	1.6	R	8.6	HS
9	Co A 11323(2000 A 240)	3.8	MR	3.3	MR	3.7	MR
10	Co A 11324 (2004 A 128)	1.3	R	3.7	MR	1.6	R
11	Co A 11325 (2005 A 108)	8.9	HS	8.8	HS	9.1	HS
12	Co A 11326 (2005 A 122)	3.4	MR	1.8	R	5.2	MS
13	Co Or 11322	8.4	HS	8.8	HS	8.3	HS
14	Co C 10336	3.5	MR	3.8	MR	3.9	MR
15	Co C 11336	1.8	R	2.0	R	1.6	R
16	Co Or 10346	8.4	HS	5.4	MS	8.4	HS
17	Co A 7219	8.3	HS	8.1	HS	8.7	HS
18	Co 7706	8.2	HS	8.6	HS	8.9	HS
19	Co A 92081 (87 A 298)	1.2	R	1.6	R	1.8	R
20	Co 86249	8.5	HS	8.8	HS	8.4	HS

R: Resistant MR : Moderately Resistant MS : Moderately Susceptible
S: Susceptible HS: Highly susceptible

Table 3: Reaction of varieties / genotypes to the three pathotypes of red rot fungus by cotton swab method at 60 days after inoculation (2013-2014)

S. No	Varieties	Pathotype of red rot fungus Reaction					
		Cf 04		Cf 06		Cf 05	
		Score on 0-9 scale	Reaction	Score on 0-9 scale	Reaction	Score on 0-9 scale	Reaction
1.	Co 997	8.2	S	8.4	S	8.6	S
2.	Co C 671	8.4	S	8.3	S	0.0	R
3.	Co 419	8.8	S	8.6	S	0.0	R
4.	Co A 12321 (2006 A 64)	0.0	R	0.0	R	0.0	R
5.	Co A 12322 (2006 A 102)	0.0	R	0.0	R	0.0	R
6.	Co A 12323 (2006 A 223)	0.0	R	0.0	R	0.0	R
7.	Co A 12324 (2007 A 177)	0.0	R	0.0	R	0.0	R
8.	Co A 11321 (2005 A 128)	0.0	R	0.0	R	0.0	R
9.	Co A 11323(2000 A 240)	0.0	R	0.0	R	0.0	R
10.	Co A 11324 (2004 A 128)	0.0	R	0.0	R	0.0	R
11.	Co A 11325 (2005 A 108)	0.0	R	0.0	R	0.0	R
12.	Co A 11326 (2005 A 122)	0.0	R	0.0	R	0.0	R
13	Co Or 11322	0.0	R	0.0	R	0.0	R
14	Co C 10336	0.0	R	0.0	R	0.0	R
15.	Co C 11336	0.0	R	0.0	R	0.0	R
16.	Co Or 10346	0.0	R	0.0	R	0.0	R
17.	Co A 7219	8.2	S	0.0	R	0.0	R
18.	Co 7706	0.0	R	0.0	R	0.0	R
19.	Co A 92081 (87 A 298)	0.0	R	0.0	R	0.0	R
20.	Co 86249	8.2	S	8.6	S	8.8	S

R: Resistant

S: Susceptible

- I **Project No.** : PP 17 (b)
- II **Project title** : Evaluation of Zonal varieties for resistance to smut
- III. **Serial number of the year of experimentation:** 19
- IV. **Location** : Regional Agricultural Research Station, Anakapalle
- V. **Objectives, results of past years and future line of work:**

This experiment is being conducted every year to select genotypes resistant to smut which are included Zonal varietal trial.

During 2011-12 Out of 24 entries tested, four entries (Co A 08323, Co C 08337, Co C08339 and Co V 92102) showed resistant reaction while one entry (Co A 08321) reacted as moderately resistant, five entries (Co C0 7336, PI 06376, PI 06377, Co Or 08346 and Co C 07337) reacted as moderately susceptible under artificial inoculated condition.

VI **Technical programme on which the report is based:**

The technical programme of work for the year 2013-14 was discussed and finalized during 30th workshop of AICRP on sugarcane held at TNAU, Coimbatore, Tamilnadu in October, 2012.

VII. **Discipline wise technical report**

- a. **Date of planting** : February 2013
- b. **Varieties (20)** : Co 997, Co C 671, Co 419, Co A 12321 (2006 A 64), Co A 12322 (2006 A 102), Co A 12323 (2006 A 223), Co A 12324 (2007 A 177) , Co A 11321 (2005 A 128), Co A 11323(2000 A 240), Co A 11324 (2004 A 128), Co A 11325 (2005 A 108), Co A 11326 (2005 A 122), Co Or 11322, Co C 10336, Co C 11336, Co Or 10346, Co A 7219, CO 7706, Co A 92081 (87 A 298), Co 86249.
- c. **Fertilizer application** : 112, 100 and 120 kg N, P₂O₅ and K₂O / ha respectively. Entire P₂O₅ and K₂O were applied as basal dose. N fertilizer (Urea) was applied two equal splits at 45 and 90 days after planting.
- d. **Irrigations** : 12-15 irrigations were given during the crop growth period.
- e. **Plant protection** : --
- f. **Plot size** : 5 m x 0.8 x 2 rows = 8 sq.m / variety`
- g. **Design** : Single series

- h. **Date of harvest** : February, 2014
- i. **Inoculum** : *Sporisorium scitamineum* (Syn. *Ustilago scitaminea*) teliospores freshly collected from smut susceptible sugarcane varieties will serve as source of inoculum.

j. **Storage**

Freshly collected smut whips were shade dried and teliospores collected by scraping and sieving. The smut spore powder so collected was packed in butter paper covers which were stored in a desiccator using calcium chloride as desiccant. Spore viability was tested before inoculation.

k. **Method of inoculation:**

The method of inoculation consists of steeping of setts (three bud) for 30 minutes in a spore suspension of over 90% viability and with a spore load of one million spores per milliliter.

l. **Name and designation of the participating scientist:**

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Sri M. Suresh, Scientist (Plant Pathology)
3. Dr. K. Prasada Rao, Principal Scientist (Sugarcane)

m. **Results recorded during the previous year:**

During 2012-13 out of 24 varieties / genotypes tested, four entries (Co A 08323, CoC 08339, COV92102 and Co 87043) showed resistant reaction while three entries (CoV 09356, CoA 10321 and Co Or 10346) reacted as moderately resistant, seven entries (CoA 09321, Co 86249, CoA 11321, CoA 11322, CoA 11323, CoA 11325 and CoA 11326) reacted as moderately susceptible. The remaining 10 entries showed susceptible to highly susceptible reaction.

n. **Results obtained during this year:**

Smut incidence was recorded at fortnightly intervals from the appearance of first smut whip. At each observation, affected clumps were rogued out to avoid secondary infection. Based on the percent smut incidence, the entries were grouped into different categories and the data are furnished in Table-4.

The data presented in Table –4 indicated that out of 20 varieties / genotypes tested, none of the entries showed resistant reaction while one entry (Co 7706) reacted as moderately resistant, five entries (Co 997, Co A 12324, Co A 11325, Co C 11336 and Co 86249) reacted as moderately susceptible. The remaining 14 entries showed susceptible to highly susceptible reaction.

VIII. **Technical programme of the year next to the reporting year:**

This experiment is being continued during 2014-15

IX. **Technical summary of the individual report:**

Twenty varieties / genotypes were tested for their resistance to smut disease. Smut incidence was recorded at fortnightly intervals from the date of appearance of first smut whip. Based on the percent smut incidence, the entries were grouped into different categories.

Out of 20 varieties / genotypes tested, none of the entries showed resistant reaction while one entry (Co 7706) reacted as moderately resistant, five entries (Co 997, Co A 12324, Co A 11325, Co C 11336 and Co 86249) reacted as moderately susceptible. The remaining 14 entries showed susceptible to highly susceptible reaction.

X. Salient findings:

Out of 20 varieties / genotypes tested, none of the entries showed resistant reaction while one entry (Co 7706) reacted as moderately resistant, five entries (Co 997, Co A 12324, Co A 11325, Co C 11336 and Co 86249) reacted as moderately susceptible. The remaining 14 entries showed susceptible to highly susceptible reaction.

Table 4: Reaction of varieties / genotypes to smut (2013- 2014)

S.No	Clone	Percent smut incidence	Reaction
1	Co 997	10.7	MS
2	Co C 671	27.7	S
3	Co 419	48.64	HS
4	Co A 12321 (2006 A 64)	43.7	HS
5	Co A 12322 (2006 A 102)	39.5	HS
6	Co A 12323 (2006 A 223)	28.2	S
7	Co A 12324 (2007 A 177)	14.7	MS
8	Co A 11321 (2005 A 128)	22.8	S
9	Co A 11323(2000 A 240)	34.3	HS
10	Co A 11324 (2004 A 128)	33.3	HS
11	Co A 11325 (2005 A 108)	16.21	MS
12	Co A 11326 (2005 A 122)	42.8	HS
13	Co Or 11322	46.8	HS
14	Co C 10336	28.2	S
15	Co C 11336	19.0	MS
16	Co Or 10346	34.6	HS
17	Co A 7219	66.6	HS
18	Co 7706	9.2	MR
19	Co A 92081 (87 A 298)	76.4	HS
20	Co 86249	18.5	MS

R: Resistant MR: Moderately Resistant MS: Moderately susceptible
S: Susceptible HS: Highly susceptible

- I **Project No.** : PP 17 (C)
- II **Project title** : Evaluation of Zonal varieties for resistance to wilt
- III. **Serial number of the year of experimentation:** 03
- IV. **Location** : Regional Agricultural Research Station, Anakapalle
- V. **Objectives, results of past years and future line of work:**

To select genotypes resistant to wilt among the agronomically important selections.

VI **Technical programme on which the report is based:**

The technical programme of work for the year 2013-14 was discussed and finalized during 30th biannual workshop of AICRP on sugarcane held at TNAU, Coimbatore in October, 2012.

VII. **Discipline wise technical report**

- a. **Date of planting** : February 2013
- b. **Varieties (20)** : Co 997, Co C 671, Co 419, Co A 12321 (2006 A 64), Co A 12322 (2006 A 102), Co A 12323 (2006 A 223), Co A 12324 (2007 A 177) , Co A 11321 (2005 A 128), Co A 11323(2000 A 240), Co A 11324 (2004 A 128), Co A 11325 (2005 A 108), Co A 11326 (2005 A 122), Co Or 11322, Co C 10336, Co C 11336, Co Or 10346, Co A 7219, CO 7706, Co A 92081 (87 A 298), Co 86249.
- c. **Fertilizer application** : 112, 100 and 120 kg N, P₂O₅ and K₂O / ha respectively. Entire P₂O₅ and K₂O were applied as basal dose. N fertilizer (Urea) was applied two equal splits at 45 and 90 days after planting.
- d. **Irrigations** : 12-15 irrigations were given during the crop growth period.
- e. **Plant protection** : --
- f. **Plot size** : 5 m x 0.8 x 2 rows = 8 sq.m / variety`
- g. **Design** : Single series
- h. **Date of harvest** : February, 2014
- i. **Method of inoculation** : Plug method
- j. **Inoculum** : Cane growing areas of the state visited during July-August, 2013 and wilt affected cane samples from different varieties were collected. Isolates obtained from the samples will be maintained on PDA. About 30 standing canes will be inoculated in each variety with each isolate by adopting plug method of inoculation.

k. Data to be collected:

1. Germination count at 45 days after planting
2. Appearance of wilt symptoms on the standing canes
3. At the end of 10 months 10 clumps are to be uprooted with roots. All the canes from the clumps will be split open longitudinally and the wilt severity index scored on a 0- 4 scale

- 0.0- 0.9 = Resistant
1.0- 1.9= Moderately Resistant
2.0- 2.9= Moderately susceptible
3.0- 3.9= Susceptible
>4.0 = Highly Susceptible

Grade

Symptoms

- | | |
|---|---|
| 0 | Healthy canes and roots with no external 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 internal tissues extending 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 tissue 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 discolouration which dislodge easily from the stalks. Roots mildly discoloured and slightly necrotic. |

$$\text{Mean wilt severity index} = \frac{\text{Sum of wilt incidences of individual stalks}}{\text{Number of stalk samples}}$$

l. Name and designation of the participating scientist:

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Sri M. Suresh, Scientist (Plant Pathology)
3. Dr. K. Prasada Rao, Principal Scientist (Sugarcane)

m. **Results recorded during the previous year:**

Out of 26 varieties / genotypes tested during 2011-12 six entries (Co A 07321, Co C 08338, Co 06030, Co 06031, CoC08338 and Co 086246) showed resistant reaction while two entries (Co 08339 and CoA 06321) reacted as moderately resistant. The remaining 18 entries showed susceptible to highly susceptible reaction.

Out of 24 varieties / genotypes tested, two entries (Co A 92081 and Co V 92102) showed resistant reaction while five entries (Co C 08339, Co A 11321, Co A 11323, Co 87043 and Co 87044) reacted as moderately resistant. The remaining 17 entries showed susceptible to highly susceptible reaction.

n. **Results obtained during this year:**

Observations on external and internal symptoms were recorded at 90 days after inoculation. Thirty inoculated canes were sampled in each entry for assessing the host reaction. Canes were observed for external symptoms like 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 discolouration which dislodge easily from the stalks. Roots mildly discoloured and slightly necrotic, reaction of the varieties / genotypes were graded on 0-4 scale.

The data presented in Table –5 indicated that out of 20 varieties / genotypes tested, four entries (Co A 12321, Co A 12322, Co C 11336 and Co A 92081) showed resistant reaction while five entries (Co A 12323, Co A 12324, Co A 11321, Co A 11323, and Co 7706) reacted as moderately resistant. The remaining 11 entries showed susceptible to highly susceptible reaction.

VIII. **Technical programme of the year next to the reporting year:**

This experiment is being continued during 2014-15.

IX. **Technical summary of the individual report:**

Out of 20 varieties / genotypes tested, four entries (Co A 12321, Co A 12322, Co C 11336 and Co A 92081) showed resistant reaction while five entries (Co A 12323, Co A 12324, Co A 11321, Co A 11323, and Co 7706) reacted as moderately resistant. The remaining 11 entries showed susceptible to highly susceptible reaction.

X. **Salient findings:**

Out of 20 varieties / genotypes tested, four entries (Co A 12321, Co A 12322, Co C 11336 and Co A 92081) showed resistant reaction while five entries (Co A 12323, Co A 12324, Co A 11321, Co A 11323, and Co 7706) reacted as moderately resistant. The remaining 11 entries showed susceptible to highly susceptible reaction.

Table 5: Reaction of varieties / genotypes to wilt during 2013- 2014 by plug method of inoculation.

S.No	Clone	Germination count At 45 DAP	Mean wilt severity index	Reaction
1	Co 997	41	3.6	S
2	Co C 671	38	3.8	S
3	Co 419	42	3.2	S
4	Co A 12321 (2006 A 64)	39	0.6	R
5	Co A 12322 (2006 A 102)	40	0.8	R
6	Co A 12323 (2006 A 223)	37	1.4	MR
7	Co A 12324 (2007 A 177)	38	1.2	MR
8	Co A 11321 (2005 A 128)	42	1.57	MR
9	Co A 11323(2000 A 240)	40	1.8	MR
10	Co A 11324 (2004 A 128)	44	3.6	S
11	Co A 11325 (2005 A 108)	37	2.2	MS
12	Co A 11326 (2005 A 122)	35	2.8	MS
13	Co Or 11322	39	3.8	S
14	Co C 10336	37	3.4	S
15	Co C 11336	41	0.4	R
16	Co Or 10346	38	3.6	S
17	Co A 7219	36	3.2	S
18	Co 7706	37	1.4	MR
19	Co A 92081 (87 A 298)	42	0.8	R
20	Co 86249	42	3.9	S

R: Resistant MR: Moderately Resistant MS: Moderately susceptible
S: Susceptible HS: Highly susceptible

- I **Project No.** : PP 22
- II **Project title** : Survey of sugarcane diseases occurring in the area on important sugarcane varieties.
- III. **Serial number of the year of experimentation:** 25
- IV. **Location** : A general survey was conducted in the state of Andhra Pradesh.
- V. **Objectives:**
To gather information on diseases naturally occurring on sugarcane and to compile a status report on all India basis.
- VI **Technical programme on which the report is based:**
The technical programme of work for the year 2013-14 was discussed and finalized during 30th biannual workshop of AICRP on sugarcane held at TNAU, Coimbatore in October, 2012.
- VII. **Dicipline wise technical report**

a) Name and designation of the participating scientist:

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Sri M. Suresh, Scientist (Plant Pathology)
3. Dr. M. K. Prasada Rao, Principal Scientist (Sugarcane)

b) Results obtained during previous year:

During 2012-13 Red rot, smut, yellow leaf disease, grassy shoot, top rot, ring spot, rust and wilt diseases were recorded on sugarcane.

c) Results obtained during this year:

A general survey was conducted to study and record the natural occurrence of diseases on important sugarcane varieties in Andhra Pradesh and the results are presented in Table – 6.

It is evident from the results presented in Table – 6 that red rot incidence to an extent of 10-30 % was observed on Co 62175, 81A 99, 93 V 297 , Co 92061and 81 V 48 in Visakhapatnam, Chittoor, Medak and Srikakulam districts. Compared to 2011-12 the cultivation of Co 62175 was reduced due to severe incidence of red rot during 2012-13. But this year also noticed the red rot incidence where the farmers who were growing ratoon crop of Co 62175.

Smut disease incidence was noticed in all most all sugarcane growing areas of Andhra Pradesh ranging from 10-50 % mostly on ratoon crop of Co A 92081,CoV 09356 (2003V46), 91 V 83, Co 86032 and 97 R 83.

Wilt incidence also was observed 10-25 % in Coastal and Telangana areas of Andhra Pradesh on Co 8368, 87 A 380, Co7219, 91 V 83, Co A 92081, Co 62175 and 81 A99.

Yellow leaf disease is increasing year after year in all sugarcane growing areas of Andhra Pradesh in all the varieties it ranges upto 80% in some of the areas surveyed during November 2013.

Top rosette, ring spot and GSD are predominant diseases recorded during the period 2013-14 on sugarcane. Rust and ring spot diseases are observed.

VIII. Technical programme of the next year to the reporting year:

The experiment is being continued during 2013-14.

Table: 6 -Natural Occurrence of sugarcane diseases in Andhra Pradesh during 2013-2014

Disease	Name of area surveyed	% disease incidence (Clump basis)	Varieties affected	Crop stage when observed	Any other information
Red rot	Timmarajupet, Ganaperthi, Kasimkota, Yetikoppaka, Chodavaram, Tandava, Nagulapalli, Munagapaka, B. Kintada, (Visakhapatnam Dt)	20-30	81A 99 81 V 48	Grand growth stage	Ratoon crop
	Amadalavalasa, Santakaviti, Honjaram, Medamarthi, Labham, Lankam, Sankili (Srikakulam Dt)	10-30	Co 62175	Grand growth stage	Ratoon crop and water logging conditions
	Chodavaram, Narsipatnam, Tandava, Etikoppaka (Visakhapatnam Dt)	10-25	81A 99 81 V 48	Grand growth stage	Water logging conditions
	Chandragiri, Madanapalli Thamballapalli Punganur, Palamaner, Nagulapalem of Chittor dt	20-30	93 V 297	Grand growth stage	Ratoon crop and water logging conditions
	Elaswvari Dt) aram, Peravaram, Yerravaram, Siripuram, Lingamathi (E. God	10-15	81 V 48	Grand growth stage	Ratoon crop and water logging conditions
	Chelgiri, Narayankhed Nizamabad Dt	10-15	Co 92061	Grand growth stage	Ratoon crop and water logging conditions
Smut	Cheepurupalli, Ranastalam, Rajam, Terlam, Nemalam Bobbili, Salur, Gajapatnagaram (Vijayanagaram Dt)	40-50	Co A 92081	Grand growth stage	More during April to June And ratoon crop
	Chodavaram, Kasimkota, Nagulapalli, Achutapuram, Kothuru, Munagapaka (Visakhapatnam Dt)	30-40	Co6907 Co A 92081	Tillering to formative phase	

	Honjaram, Medamarthi, Sankili (Srikakulam Dt)	10-20	CoA 92081 CoA 99082 (93 A145)	Tillering to formative phase	
	Kasala, Hatnoora, Konyal Chickmaddur, shivampet, Choutkur, Andol, Jogipet, Annasagar (Medak Dt)	30-40	CoA 92081 97 R 401 Co 86032, 83 A 30, 93 V 297	Tillering to formative phase	
	Samalkot, Peravaram Elaswaram, yerravarm, Chelluru (East Godavari dt)	10-20	Co A 92081, CoV 09356 (2003V46), 91 V 83	Tillering	
	Chodavaram, Narsipatnam, Tandava, Etikoppaka (Visakhapatnam Dt)	10-25	Co6907 Co A 92081	Grand growth stage	
Wilt	Kurthi, Shelgera, Thornal Medak Dt	10-15	Co 86032	Grand growth stage	Ratoon crop
	Samalkot, Elaswaram, yerravarm, Chelluru (East Godavari dt)	10-15	91 V 83	Grand growth stage	Ratoon crop
	Kothahota (Karimnagar Dt), Sultanpur, Bansuwada, Pitlam, Cheligiri (Nizamabad Dt)	5-20	93 V 297	Tillering stage	Ratoon crop
	Kasimkota, Munagapaka, Chodavaram, Narsipatnam, Tandava, Etikoppaka (Visakhapatnam Dt)	15-25	CoA 92081 81 A99	Grand growth stage	Ratoon crop
	NCS Sugar factory, Bobbili, , Salur, Gajapatnagar, Garividi, Rambhadrapuram, Makkuva of Vizayanagar Dt	20-25	Co 6907, 81 A99 Co 62175, Co 7601	Grand growth stage	Ratoon crop
YLD	Bobbili, Salur, Gajapatnagar, Cheepurupalli, Ranastalam, Rajam, Terlam, Nemalam (Vijayanagar Dt)	10-50	CoA 92081, Co 86032, Co 8368, CoV 09356 (2003V46)	Grand growth stage	Drought situation followed by heavy rains Ratoon crop and water logging conditions
	Timmarajupet, Ganaperthi, Kasimkota, Yetikoppaka, Chodavaram, Tandava, Nagulapalli, Munagapaka, B. Kintada, (Visakhapatnam Dt)	15-25	Co6907, Co A 06321, Co A 9208	Grand growth stage	
	Kothahota (Karimnagar Dt), Sultanpur, Bansuwada, Pitlam, Cheligiri (Nizamabad Dt) Kasala, Hatnoora, Konyal Chickmaddur, shivampet, Choutkur, Andol, Jogipet, Annasagar (Medak Dt)	30-75	93 V 297 Co A 92081, 83R 23, Co 7805, 85 R 186, 83 A 30, Co 86032, Co 95026	Grand growth stage	

	Samalkot, Elawaram, yerravarm, Chelluru (East Godavari dt)	30-60	Co A 92081, 2003V46, Co A 06321 91 V 83, CoV 92102	Grand growth stage	
	Ganapati sugar factory area sangareddi	30-50	83 A 30, Co 86032	Grand growth stage	
	Trident sugar factory area Medak Dt	40-80	83 A 30, Co 86032	Grand growth stage	
	Maggi sugar factory area, Nizamabad Dt	50-80	83 A 30, Co 86032	Grand growth stage	
GSD	Nagulapalli, Achutapuram, Kothuru, Munagapaka (Visakhapatnam Dt)	50-60	C0 7219 CoA 92081	Tillering	More severe in ratoons
	Samalkot, Elawaram, yerravarm, Chelluru (East Godavari dt)	10-20	Co A 92081, CoV 09356 (2003V46)CoV 92102	Ratoons	Tillering
	Maggi sugar factory area, Nizamabad Dt	5- 10	83 A 30, Co 86032	Grand growth stage	Ratoons
Rust	NCS Sugar factory, Bobbili, Salur, Gajapatinagaram, Garividi, Rambhadrapuram, Makkuva of Vizayanagaram Dt	15-20	CoA 92081	Grand growth stage	Increased after heavy Neelam cyclonic rains during November
	Timmarajupet, Ganaperthi, Kasimkota, Yetikoppaka, Chodavaram, Tandava, Nagulapalli, Munagapaka, B. Kintada, (Visakhapatnam Dt)	30-40	Co6907, C0 7219 CoA 92081	Tillering to cane formation	
	Kurthi, Shelgera, Thornal Medak Dt	10-15	Co 94012	Grand growth stage	
Ring Spot	Bobbili, Salur, Gajapatinagaram (Vijayanagaram Dt)	40-50	CoA 92081	Grand growth stage	Increased after heavy Neelam cyclonic rains during Nov.
	Nagulapalli, Achutapuram, Kothuru, Munagapaka (Visakhapatnam Dt)	30-40	Co6907, C0 7219 CoA 92081	Grand growth stage	
	Kasala, Hatnoora, Konyal, shivampet, Choutkur, Andol, Jogipet (Medak Dt)	10-20	85 R 186	Grand growth stage	

- I **Project No.** : PP 23
- II **Project title** : Assessment of elite and ISH genotypes for resistance to red rot.
- III. **Serial number of the year of experimentation:** 03
- IV. **Location** : Regional Agricultural Research Station, Anakapalle
- V. **Objectives, results of past years and future line of work:**
- This experiment is being conducted every year to obtain information on relative resistance of varieties included in Zonal varietal trial. During 2011-12 and 2012-13, seventeen ISH entries / genotypes tested for their reaction to two pathotypes (Cf 04, Cf 06 and Cf 05 of red rot fungus individually by plug method of inoculation.
- VI **Technical programme on which the report is based:**
- The technical programme of work for the year 2013-14 was discussed and finalized during 30th biannual workshop of AICRP on sugarcane held at TNAU, Coimbatore in October, 2012.
- VII. **Discipline wise technical report**
- a. **Date of planting** : February 2013
- b. **Varieties (17)** : ISH 257, ISH 263, ISH 267, ISH 293, ISH 287, ISH 296, ISH 282, ISH 280, ISH 271, ISH 291, ISH 276, ISH 308, ISH 338, ISH 274, ISH 312, ISH 301, ISH 285
- c. **Fertilizer application** : 112, 100 and 120 kg N, P₂O₅ and K₂O / ha respectively. Entire P₂O₅ and K₂O were applied as basal dose. N fertilizer (Urea) was applied two equal splits at 45 and 90 days after planting.
- d. **Irrigations** : 12-15 irrigations were given during the crop growth period.
- e. **Plant protection** : --
- f. **Date of inoculations** : September, 2013
1. **Plug method** : September, 2013
- g. **Plot size** : 10 m x 0.8 x 2 rows = 16 sq.m / variety`
- h. **Design** : Single series
- i. **Replications** : Non – replicated
- j. **Dates of harvesting** :
- i. **Plug method** : November 2013

k. Name and designation of the participating scientist:

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Sri M. Suresh, Scientist (Plant Pathology)
3. Dr. K. Prasada Rao, Principal Scientist (Sugarcane)

l. Results recorded during the previous year:

Out of 17 varieties / genotypes tested by plug method of inoculation during 2011-12 six entries (ISH-263, ISH- 267, ISH- 276, ISH- 291 and ISH- 312) showed resistance while 3 entries ISH-280, ISH 271 and ISH 308 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05 and remaining are highly susceptible.

Out of 17 varieties / genotypes tested by plug method of inoculation during 2012-13 five entries (ISH-26, ISH- 276, ISH-282, ISH- 291 and ISH- 312) showed resistance while 4 entries ISH- 280, ISH 271, ISH- 338 and ISH 308 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05 and remaining are highly susceptible.

m. Results obtained during this year:

1. Plug method:

Observations on external and internal symptoms were recorded at 60 days after inoculation. Thirty inoculated canes were sampled in each entry for assessing the host reaction. Canes were observed for external symptoms like yellowing or drying of tops. Later, the canes were split opened longitudinally and recorded for internal characteristics of the disease like lesion width, white spots and extent of nodal transgression. Based on the average score of above four characters, reaction of the varieties / genotypes were graded on 0-9 scale and the data are presented in Table – 7.

Results presented in table – 7 revealed that Out of 17 varieties / genotypes tested by plug method of inoculation five entries (ISH-267, ISH-282, ISH- 291 and ISH- 312) showed resistance while 4 entries ISH- 276, ISH- 280, ISH 271, ISH- 338 and ISH 308 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05 and remaining are highly susceptible.

VIII Technical programme of the year next to the reporting year:

This experiment will be concluded as three years are completed.

IX Technical summary of the individual report:

Seventeen varieties / genotypes were tested for their reaction to two pathotypes (Cf 04, Cf 05 and Cf 06) of red rot fungus individually and as a mixture by nodal and plug method of inoculation.

Out of 17 varieties / genotypes tested by plug method of inoculation five entries (ISH-267, ISH-282, ISH- 291 and ISH- 312) showed resistance while 4 entries ISH- 276, ISH- 280, ISH 271, ISH- 338 and ISH 308 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05 and remaining are highly susceptible.

X. Salient findings:

Out of 17 varieties / genotypes tested by plug method of inoculation five entries (ISH-267, ISH-282, ISH- 291 and ISH- 312) showed resistance while 4 entries ISH- 276, ISH- 280, ISH 271, ISH- 338 and ISH 308 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05 and remaining are highly susceptible.

Table 7. Reaction of ISH sugarcane entries to Cf 04, Cf 06 and Cf 05 under Plug method at 60 days after Inoculation (2013-14)

S.No	Varieties	Pathotype of red rot fungus					
		Cf 04		Cf 06		Cf 05	
		Score on 0-9 scale	Reaction	Score on 0-9 scale	Reaction	Score on 0-9 scale	Reaction
1	ISH 257	8.2	H.S	8.7	H.S	8.4	HS
2	ISH 263	5.6	MS	5.8	MS	4.2	MS
3	ISH 267	1.2	R	1.8	R	1.2	R
4	ISH 271	3.2	MR	2.6	MR	3.2	MR
5	ISH 274	4.6	MS	4.2	MS	5.6	MS
6	ISH 276	2.2	MR	1.2	R	2.4	MR
7	ISH 280	2.8	MR	3.4	MR	3.2	MR
8	ISH 282	1.8	R	2.2	MR	1.2	R
9	ISH 285	8.8	HS	8.4	HS	9.0	HS
10	ISH 287	9.0	HS	8.9	HS	9.0	HS
11	ISH 291	1.2	R	1.5	R	1.2	R
12	ISH 293	4.6	MS	4.8	MS	5.2	MS
13	ISH 296	8.8	HS	8.2	HS	9.0	HS
14	ISH 301	8.6	HS	9.0	HS	8.2	HS
15	ISH 308	2.6	MR	3.2	MR	3.6	MR
16	ISH 312	1.2	R	1.8	R	1.0	R
17	ISH 338	3.4	MR	3.2	MR	3.8	MR

R: Resistant MR : Moderately Resistant MS : Moderately Susceptible
 S: Susceptible HS: Highly susceptible

- I. Project No.** PP-30
- II. Project Title** Assessment of field resistance in sugarcane to red rot.
- III. Serial number of the year of experimentation:** 02
- IV. Location** Regional Agricultural Research Station, Anakapalle.
- V. Technical programme on which the report is based:**

VI Discipline wise technical report

- I.
- a. **Date of planting** : February 2013
- b. **Varieties (20)** : Co 997, Co C 671, Co 419, Co A 12321 (2006 A 64), Co A 12322 (2006 A 102), Co A 12323 (2006 A 223), Co A 12324 (2007 A 177) , Co A 11321 (2005 A 128), Co A 11323(2000 A 240), Co A 11324 (2004 A 128), Co A 11325 (2005 A 108), Co A 11326 (2005 A 122), Co Or 11322, Co C 10336, Co C 11336, Co Or 10346, Co A 7219, CO 7706, Co A 92081 (87 A 298), Co 86249.
- c. **Fertilizer application** : 112, 100 and 120 kg N, P₂O₅ and K₂O / ha respectively. Entire P₂O₅ and K₂O were applied as basal dose. N fertilizer (Urea) was applied two equal splits at 45 and 90 days after planting.
- d. **Irrigations** : 12-15 irrigations were given during the crop growth period.
- e. **Plant protection** : --
- f. **Date of inoculations** : The same day of planting (19.02.2013)
- g. **Plot size** : 10 m x 0.8 x 2 rows = 16 sq.m / variety`
- h. **Design** : Single series
- i. **Replications** : Non – replicated
- j. **Dates of harvesting** : November, 2013
- k. **Name and designation of the participating scientist:**

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Sri M. Suresh, Scientist (Plant Pathology)
3. Dr. M. Prasada Rao, Principal Scientist (Sugarcane)

1. **Results recorded during the previous year:**

During 2012-13 twenty seven varieties / genotypes were screened for field resistance to red rot by grain method of inoculation Fourteen entries (Co A 09321, Co C 01061, Co 6907, Co 7219, Co 86249, Co 6031, Co A 11321, Co A 11322, Co A 11324, Co A 11325 and Co 87044) in addition to susceptible checks Co C 671, Co 419 and Co 997 exhibited varying symptoms like Yellowing of leaves in settling (SY) and Drying of leaves in settling (SD). Remaining 13 entries showed resistance and not exhibited any kind of symptoms.

m. Results obtained during this year:

Twenty varieties / genotypes were screened for field resistance to red rot by grain method of inoculation seven entries (Co A 12323, Co A 11325, Co Or 11322, Co C 10336, Co Or 10346, Co A 7219 and Co 86249) in addition to susceptible checks Co C 671, Co 419 and Co 997 exhibited varying symptoms like Yellowing of leaves in settling (SY) and Drying of leaves in settling (SD). Remaining 10 entries showed resistance and not exhibited any kind of symptoms including the resistant check Co A 92081.

VIII Technical programme of the year next to the reporting year:

This experiment is being continued during 2014-15.

IX. Technical summary of the individual report:

Twenty varieties / genotypes screened for field resistance to red rot by grain method of inoculation. Seven entries (Co A 12323, Co A 11325, Co Or 11322, Co C 10336, Co Or 10346, Co A 7219 and Co 86249) in addition to susceptible checks Co C 671, Co 419 and Co 997 exhibited varying symptoms like Yellowing of leaves in settling (SY) and Drying of leaves in settling (SD). Remaining 10 entries showed resistance and not exhibited any kind of symptoms including the resistant check Co A 92081.

X. Salient findings:

Twenty varieties / genotypes screened for field resistance to red rot by grain method of inoculation, seven entries (Co A 12323, Co A 11325, Co Or 11322, Co C 10336, Co Or 10346, Co A 7219 and Co 86249) in addition to susceptible checks Co C 671, Co 419 and Co 997 exhibited varying symptoms like Yellowing of leaves in settling (SY) and Drying of leaves in settling (SD). Remaining 10 entries showed resistance and not exhibited any kind of symptoms including the resistant check Co A 92081.

Table 8: Assessment of field resistance in sugarcane to red rot (2013- 2014)

S.No	Clone	Reaction to red rot	Symptoms observed	<i>C. falcatum</i> recovered (Yes/No)
1	Co 997	S	SY, SD, SM	Yes
2	Co C 671	S	SY,SD, CD	Yes
3	Co 419	S	SY, SD, CD	Yes
4	Co A 12321 (2006 A 64)	R	--	No
5	Co A 12322 (2006 A 102)	R	--	No
6	Co A 12323 (2006 A 223)	S	SY,SD, SM	Yes
7	Co A 12324 (2007 A 177)	R	--	No
8	Co A 11321 (2005 A 128)	R	--	No
9	Co A 11323(2000 A 240)	R	--	No
10	Co A 11324 (2004 A 128)	R	--	No
11	Co A 11325 (2005 A 108)	S	SY,SD, SM	Yes
12	Co A 11326 (2005 A 122)	R	--	No
13	Co Or 11322	S	SY, SD --	Yes
14	Co C 10336	S	SY	No
15	Co C 11336	R	--	No
16	Co Or 10346	S	SY,SD	Yes
17	Co A 7219	S	SY, SD	No
18	Co 7706	R	--	No
19	Co A 92081 (87 A 298)	R	--	No
20	Co 86249	S	SY,SD	No

Yellowing of leaves in settling (SY); Drying of leaves in settling (SD); Settling mortality (SM); Rotting in intermodal tissue of cane (CR); Yellowing of spindle leaves (LY); Drying of spindle leaves (LD); Whole clump drying (CD).

II **Project title** : Screening, epidemiology and management of top rot in sugarcane.

III. **Serial number of the year of experimentation:** 03

IV. **Location** : Regional Agricultural Research Station, Anakapalle

V. **Objectives, results of past years and future line of work:**

This experiment is being conducted every year from 2011-12 to obtain information on relative resistance of varieties included in Zonal varietal trial. During 2011-12, 51 entries / genotypes were tested for their reaction to top rot disease under natural conditions.

VI **Technical programme on which the report is based:**

The technical programme of work for the year 2013-14 was discussed and finalized during 30th biannual workshop of AICRP on sugarcane held at TNAU, Coimbatore in October, 2012.

VII. **Discipline wise technical report**

a. **Date of planting** : 17.02.2013

b. **Varieties** : 20
Co 997, Co C 671, Co 419, Co A 12321 (2006 A 64), Co A 12322 (2006 A 102), Co A 12323 (2006 A 223), Co A 12324 (2007 A 177) , Co A 11321 (2005 A 128), Co A 11323(2000 A 240), Co A 11324 (2004 A 128), Co A 11325 (2005 A 108), Co A 11326 (2005 A 122), Co Or 11322, Co C 10336, Co C 11336, Co Or 10346, Co A 7219, CO 7706, Co A 92081 (87 A 298), Co 86249.

c. **Fertilizer application** : 112, 100 and 120 kg N, P₂O₅ and K₂O / ha respectively. Entire P₂O₅ and K₂O were applied as basal dose. N fertilizer (Urea) was applied two equal splits at 45 and 90 days after planting.

d. **Irrigations** : 12-15 irrigations were given during the crop growth period.

e. **Plant protection** : --

g. **Plot size** : 10 m x 0.8 x 2 rows = 16 sq.m / variety (For screening)

h. **Design** : Single series (For screening)

i. **Replications** : Non – replicated (For screening)

j. **Dates of harvesting** : February, 2014

k. **Name and designation of the participating scientist:**

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Sri M. Suresh, Scientist (Plant Pathology)
3. Dr. K. Prasada Rao, Principal Scientist (Sugarcane)

1. **Results recorded during the previous year:**

During 2011-12 Fifty one varieties / genotypes were screened against top rot disease under natural conditions Out of 51 varieties / genotypes five varieties (Co C 671, Co A 99082, Co 7706, Co A 09321, Co A 92081, and 2008 A 380) showed Highly Susceptible, while six entries Co 419, Co C 1061, Co C 8339, Co V 92102, Co 7805 and Co A 08321 susceptible reaction to top rot disease and remaining are Resistant.

Out of 52 varieties / genotypes were screened during 2012-13 against top rot disease under natural conditions nine entries/varieties (Co 419, Co C 671, Co 7706, Co A 92081 (87 A 298), Co A 99082 (93 A145), 2008A 171, 2008A 124, 2008A 380 and Co V 92102) showed Highly Susceptible, while five entries 2008A234, 2009A302, 2009A288, Co A 11322 and Co A 11326) susceptible reaction to top rot disease and remaining are resistant.

m. **Results obtained during this year:**

Screening: Results presented in table – 9 revealed that out of 20 varieties / genotypes five varieties screened against top rot disease under natural conditions (Co C 671, Co 419, 2010 A 440, 2010 A 155, CO 7706 and CoA 11326) showed Highly Susceptible, while five entries 2007 A 177, 2009 A 288, 2009 A 302, C 6907 and CoV 92102 susceptible reaction to top rot disease and remaining are Resistant.

Management: Results presented in table – 10 revealed that T3 (Sett treatment + Foliar spray- Carbendaizim -0.05%) showed the highest percent germination and also low disease incidence of toprot disease (82.44 and 4.32 respectively) compared to the other treatments.

Epidemiology: The disease incidence was initiated during the Ist fortnight of June and gradually increased till November and then the disease was slowdown. Highest disease was observed during the month of October. The disease incidence was positively correlated with the number of rainy days, low temperature and high RH.

VIII. Technical programme of the year next to the reporting year:

This experiment is being continued during 2014-15.

IX. Technical summary of the individual report:

Out of 20 varieties / genotypes were screened against top rot disease under natural conditions four entries/varieties (Co C 671, Co A 12323, Co A 11326 , Co 7706) showed susceptible reaction while four entries Co 419, Co A 11323, Co A 92081 and Co 86249) moderately susceptible reaction to top rot disease and remaining are resistant.

Management: Results presented in table – 10 revealed that T3 (Sett treatment + Foliar spray- Carbendaizim -0.05%) showed the highest percent germination and also low disease incidence of toprot disease (82.44 and 4.32 respectively) compared to the other treatments.

Epidemiology: The disease incidence was initiated during the Ist fortnight of June and gradually increased till November and then the disease was slowdown. Highest disease was observed during

the month of October. The disease incidence was positively correlated with the number of rainy days, low temperature and high RH.

X. Salient findings:

Out of 20 varieties / genotypes were screened against top rot disease under natural conditions four entries/varieties (Co C 671, Co A 12323, Co A 11326 , Co 7706) showed susceptible reaction while four entries Co 419, Co A 11323, Co A 92081 and Co 86249) moderately susceptible reaction to top rot disease and remaining are resistant.

Table: 9 – Reaction of Sugarcane clones for resistance to top rot (20013-2014)

S. No	Varieties	Per cent infected plants				Reaction
		Mild	Moderate	Severe	Total incidence	
1.	Co 997	9	4	2	15	S
2.	Co C 671	18	7	4	39	HS
3.	Co 419	4	2	0	6	MS
4.	Co A 12321 (2006 A 64)	0	0	0	0	R
5.	Co A 12322 (2006 A 102)	0	0	0	0	R
6.	Co A 12323 (2006 A 223)	12	8	6	26	HS
7.	Co A 12324 (2007 A 177)	0	0	0	0	R
8.	Co A 11321 (2005 A 128)	0	0	0	0	R
9.	Co A 11323(2000 A 240)	8	6	2	16	MS
10.	Co A 11324 (2004 A 128)	0	0	0	0	R
11.	Co A 11325 (2005 A 108)	0	0	0	0	R
12.	Co A 11326 (2005 A 122)	11	7	4	22	HS
13.	Co Or 11322	0	0	0	0	R
14.	Co C 10336	0	0	0	0	R
15.	Co C 11336	0	0	0	0	R
16.	Co Or 10346	0	0	0	0	R
17.	Co A 7219	0	0	0	0	R
18.	Co 7706	13	5	2	20	HS
19.	Co A 92081 (87 A 298)	9	5	1	15	MS
20.	Co 86249	5	2	0	7	MS

R: Resistant , MR: Moderately Resistant, MS: Moderately Susceptible, S: Susceptible, HS: Highly Susceptible

Table: 10 Management of toprot disease in sugarcane during 2013-14

Treatments		Germination (%)	Disease incidence
T1	Sett treatment- Overnight soaking with carbendaizim- 0.1% a.i	78.60	16.43
T2	Foliar spray- Carbendaizim -0.05% a.i (3 sprays at 15 days interval from May 15 th)	72.24	12.86
T3	Sett treatment (T1) + Foliar spray- Carbendaizim -0.05% (T2)	82.44	4.32
T4	Control	64.23	24.64
	SE+	1.60	0.61
	CD at 5 %	NS	1.80
	C.V. %	5.80	5.60

Table: 11- Weather data and top rot incidence at RARS, Anakapalle during crop growth Period of sugarcane during 2013-14

Month & Year	No. of Rainy Days	Rain (mm)	Temperature (c°)		R.H%		Wind velocity (kmph)	B.S.S.H	Evaporation (m.m)	Top rot (PDI)
			Max	Min	F.N	A.N				
Jan, 2013	1	19.8	30.1	14.9	95	56	1.2	6.0	3.1	0.0
Feb, 2013	1	5.0	31.7	15.0	91	44	2	6.8	4.0	0.0
Mar, 2013	1	5.0	35.0	17.5	88	42	2	8.1	5.5	0.0
April, 2013	4	38.0	35.1	21.5	89	55	2.3	7.6	5.5	0.0
May, 2013	2	5.4	37.69	25.1	86	55	2.7	6.9	6.2	3.5
June, 2013	8	43.2	34.8	23.8	86	59	2.0	4.6	5.0	6.8
July, 2013	10	29.6	33.1	23.2	88	66	2.1	2.7	4.86	7.4
Aug, 2013	12	155.2	32.5	22.7	90	68	1.0	4.8	4.0	24.2
Sept, 2013	16	149.2	32.9	21.8	92	66	0.5	5.2	2.9	37.6
Oct, 2013	12	573.6	30.4	21.3	92	72	0.9	4.2	2.8	41.3
Nov, 2013	3	88.4	30.0	17.4	91	65	0.05	6.6	2.9	14.6
Dec, 2013	0	0.0	29.5	14.6	90	54	0.1	6.8	3.2	0.0
Jan, 2014	0	0.0	29.5	14.6	94	52	0.1	6.1	2.9	0.0

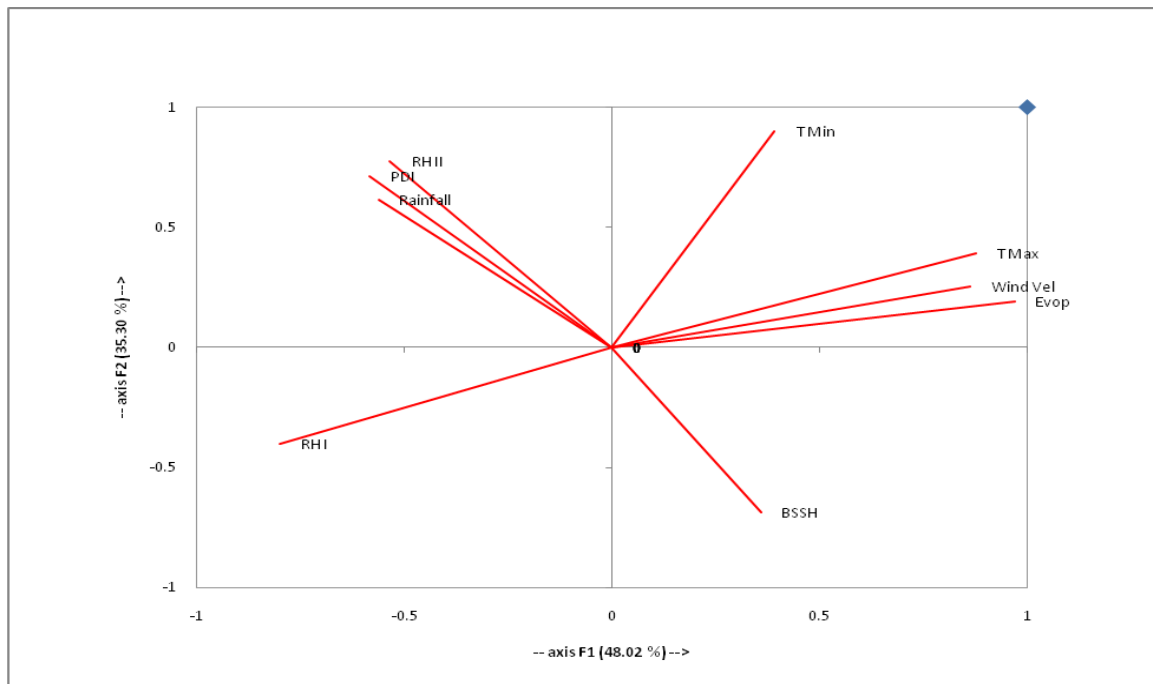
Correlation matrix:

	Rainfall	T Max	T Min	RH I	RH II	Wind Vel	BSSH	Evop	PDI
Rainfall	1	-0.235	0.269	0.225	0.664	-0.232	-0.433	-0.395	0.841
T Max	-0.235	1	0.720	-0.807	-0.190	0.835	0.159	0.919	-0.147
T Min	0.269	0.720	1	-0.662	0.525	0.516	-0.456	0.543	0.410
RH I	0.225	-0.807	-0.662	1	0.099	-0.669	-0.007	-0.842	0.195
RH II	0.664	-0.190	0.525	0.099	1	-0.320	-0.745	-0.369	0.790
Wind Vel	-0.232	0.835	0.516	-0.669	-0.320	1	0.069	0.897	-0.345
BSSH	-0.433	0.159	-0.456	-0.007	-0.745	0.069	1	0.229	-0.518
Evop	-0.395	0.919	0.543	-0.842	-0.369	0.897	0.229	1	-0.443
PDI	0.841	-0.147	0.410	0.195	0.790	-0.345	-0.518	-0.443	1

In bold, significant values (except diagonal) at the level of significance alpha=0.050 (two-tailed test)

$$\text{PDI} = -33.046 + 5.358\text{E-}02 \cdot \text{Rainfall} + 0.670 \cdot \text{RH II}$$

Principle Coordinate Analysis for toprot disease:



- I **Project No.** : PP 28 (a)
- II **Project title** : Management of rust of Sugarcane
- III. **Serial number of the year of experimentation:** 01
- IV. **Location** : Regional Agricultural Research Station, Anakapalle
- V. **Objectives, results of past years and future line of work:**

New experiment

VI **Technical programme on which the report is based:**

The technical programme of work for the year 2013-14 was discussed and finalized during 30th biannual workshop of AICRP on sugarcane held at TNAU, Coimbatore in October, 2012.

VII. **Discipline wise technical report**

- a. **Date of planting** : June 2013
- b. **Variety** : Co A 92081
- c. **Fertilizer application** : 112, 100 and 120 kg N, P₂O₅ and K₂O / ha respectively. Entire P₂O₅ and K₂O were applied as basal dose. N fertilizer (Urea) was applied two equal splits at 45 and 90 days after planting.
- d. **Irrigations** : 12-15 irrigations were given during the crop growth period.
- e. **Plant protection** : --
- g. **Plot size** : 6 x 7 sq. m
- h. **Design** : RBD
- i. **Replications** : 4
- j. **Dates of harvesting** : February, 2014
- k. **Name and designation of the participating scientist:**
1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
 2. Sri M. Suresh, Scientist (Plant Pathology)
 3. Dr. K. Prasada Rao, Principal Scientist (Sugarcane)

l. **Results recorded during the previous year:**

New project

m. Results obtained during this year:

The data presented in the table revealed the cane yield differed significantly due to various treatments under study. The cane yield was maximum in T3 (Propineb -Antracol - 0.25%) i.e. 83.37 t/ha. This was significantly superior over the control (64.46 t/ha). The second best treatment was T1 (Chlorothalonil-Kavach-0.25%) which showed similar trend as that of T2. The percent commercial cane sugar was not influenced significantly by fungicides. There is significant difference in disease incidence in treated and untreated plots. The maximum disease control was observed in T3 (Propineb-Antracol @ 0.25%) i.e.77.65 %, which was superior over rest of the treatments.

VIII. Technical programme of the year next to the reporting year:

This experiment is being continued during 2014-15.

IX. Technical summary of the individual report:

The cane yield differed significantly due to various treatments under study. The cane yield was maximum in T3 (Propineb -Antracol - 0.25%) i.e. 83.37 t/ha. This was significantly superior over the control (64.46 t/ha). The second best treatment was T1 (Chlorothalonil-Kavach-0.25%) which showed similar trend as that of T2. The percent commercial cane sugar was not influenced significantly by fungicides. There is significant difference in disease incidence in treated and untreated plots. The maximum disease control was observed in T3 (Propineb-Antracol @ 0.25%) i.e.77.65 %, which was superior over rest of the treatments.

X. Salient findings:

The cane yield differed significantly due to various treatments under study. The cane yield was maximum in T3 (Propineb -Antracol - 0.25%) i.e. 83.37 t/ha. This was significantly superior over the control (64.46 t/ha). The second best treatment was T1 (Chlorothalonil-Kavach-0.25%) which showed similar trend as that of T2. The percent commercial cane sugar was not influenced significantly by fungicides. There is significant difference in disease incidence in treated and untreated plots. The maximum disease control was observed in T3 (Propineb-Antracol @ 0.25%) i.e.77.65 %, which was superior over rest of the treatments.

Table12 : Effect of fungicides on growth parameters and incidence of rust disease of sugarcane

S. No.	Treatments	Germination (%)	Disease severity (%)	Cane yield (t/Ha)	Brix (%)	Sucrose (%)	Purity (%)	CCS (%)	Disease Control (%)
1.	Chlorothalonil (Kavach) 0.25%	82.64	32.14	74.43	20.0	17.9	89.5	12.79	47.05
2	Mancozeb (Dithane M-45) -0.20%	81.23	15.56	81.08	19.2	17.07	88.9	12.16	49.57
3.	Propineb (Antracol) - 0.25 %	81.56	12.43	83.37	20.6	18.48	89.70	13.22	77.65
4.	Triadimefon (Bayleton) - 0.10 %	78.34	35.55.	68.08	18.6	16.07	86.3	11.29	63.43
5	Control (Untreated)	83.45	64.34	64.56	18.0	16.04	89.11	11.22	0.00
	S.E. \pm	2.68	1.83	4.02	1.78	1.93	2.03	0.31	3.25
	CD at 5%	NS	5.63	12.40	NS	NS	NS	NS	10.01
	C.V.%	8.12	13.54	6.36	3.57	3.84	4.23	4.24	13.68

- I **Project No.** : PP 28 (b)
- II **Project title** : Methodology for screening sugarcane genotypes for resistance to brown rust (*Puccinia melanocephala*)
- III. **Serial number of the year of experimentation:** 01
- IV. **Location** : Regional Agricultural Research Station, Anakapalle
- V. **Objectives, results of past years and future line of work:**

New experiment

VI **Technical programme on which the report is based:**

The technical programme of work for the year 2013-14 was discussed and finalized during 30th biannual workshop of AICRP on sugarcane held at TNAU, Coimbatore in October, 2012.

VII. **Discipline wise technical report**

- a. **Date of planting** : June 2013
- b. **Varieties** : Co A 92081
- c. **Fertilizer application** : 112, 100 and 120 kg N, P₂O₅ and K₂O / ha respectively. Entire P₂O₅ and K₂O were applied as basal dose. N fertilizer (Urea) was applied two equal splits at 45 and 90 days after planting.
- d. Irrigations : 8-10 irrigations were given during the crop growth period.

e. **Inoculation methodology :**

(i) **Clip inoculation in leaf whorl**

As soon as brown rust appears in field, select rust affected leaves. Cut leaf bits (clips) measuring 8-10 cm. Select ten rust-free plants of the same susceptible variety in different location. In three shoots of each plant (clump), insert 2-3 clips in the leaf whorl of each shoot.

(ii) **Leaf whorl inoculation**

As soon as brown rust appears in field, collect rust affected leaves. Make a suspension of urediniopores in sterilized distilled water (10⁴-10⁵ spores/ml). Pour 1 ml freshly prepared urediniospore suspension in each leaf whorl. Inoculate in 10 clumps (three shoots per clump) of same susceptible variety.

In the aforementioned two methods, plants to be inoculated may be marked by cutting one-third of the tips of the uppermost leaves so that they can easily be identified during recording observations.

- f. **Observations :** After 4 weeks, record symptoms on leaves by counting- (i) average number of rust pustules per square inch, and (ii) number of leaves bearing rust pustules.

- g. **Plant protection** : --

- h. **Plot size** : 6 x 7 sq. m `
- i. **Design** : --
- j. **Replications** : --
- k. **Dates of harvesting** : February, 2014

l. **Name and designation of the participating scientist:**

- 1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
- 2. Sri M. Suresh, Scientist (Plant Pathology)
- 3. Dr. K. Prasada Rao, Principal Scientist (Sugarcane)

m. **Results recorded during the previous year:**

New project

n. **Results obtained during this year:**

Among the two methods for inoculation of urediospores of brown rust and rating of resistance, average number of rust pustules per square inch are more in leaf whorl inoculation method with 6.22 compared to clip inoculation in leaf whorl (3.26). Seven leaves showed rust pustules in leaf whorl inoculation method compared to clip inoculation method with four leaves.

VIII. Technical programme of the year next to the reporting year:

This experiment is being continued during 2014-15.

IX. Technical summary of the individual report:

Among the two methods for inoculation of urediospores of brown rust and rating of resistance, average number of rust pustules per square inch are more in leaf whorl inoculation method with 6.22 compared to clip inoculation in leaf whorl (3.26). Seven leaves showed rust pustules in leaf whorl inoculation method compared to clip inoculation method with four leaves.

X. Salient findings:

Among the two methods for inoculation of urediospores of brown rust and rating of resistance, average number of rust pustules per square inch are more in leaf whorl inoculation method with 6.22 compared to clip inoculation in leaf whorl (3.26). Seven leaves showed rust pustules in leaf whorl inoculation method compared to clip inoculation method with four leaves.

Table 13: Comparison of inoculation methodology for screening of rust disease (2013-14)

Method of inoculation	Average number of rust pustules per square inch	Number of leaves bearing rust pustules
Clip inoculation in leaf whorl	3.26	4.0
Leaf whorl inoculation	6.22	7.0

