ANNUAL REPORT FOR THE YEAR 2015-16
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 2015-2016

S. No	Project No	Project title
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 17 (d)**	Evaluation of zonal varieties for resistance to YLD
6	**PP 22**	Survey of sugarcane diseases occurring in the area on important sugarcane varieties
7	**PP 31**	Screening, epidemiology and management of top rot in sugarcane.

ANNUAL REPORT FOR THE YEAR 2015-16
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**: 34

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 2014-15 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 2015-16 was discussed and finalized during Annual group meet of AICRP on sugarcane held at IISR, Lucknow, November, 2014.

VII **Discipline wise technical report:**

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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, 2015)
2	Co C 671	2011	SBI , Coimbatore (Rejuvenated in July, 2015)
3	Co 997	2011	SBI , Coimbatore (Rejuvenated in July, 2015)
4	85 A 261 (CoA 89085)	1997	Nellore (Rejuvenated in July, 2015)
5	81 V 48	2015	Munagapaka (Visakhapatnam Dt)
6	Co 62175	2015	Juthada (Visakhapatnam Dt)
7	CoA 09321	2015	Elaswaram (west Godavari Dt.)
8	81 A 99	2015	Tandava (Visakhapatnam Dt.)

b. **Date of Planting** : February 2015

c. **Varieties (19)** : 1. *Baragua* (*S. officinarum*); 2. *Khakai* (*S. sinense*); 3. SES 594 (*S. spontaneum*); 4. CoS 767; 5. BO 91; 6. CoC 671; 7. Co 7717; 8. Co 997; 9. CoJ 64; 10. Co 1148; 11. Co 419; 12. Co 62399; 13.

Co 975; 14. CoS 8436, 15. Co 7805, 16. Co 86002, 17. Co 86032, 18. CoV 92102 and 19. CoSe 95422

d. **Fertilizer application** : 112, 100 and 120 kg N, P_2O_5 and K_2O / ha respectively. Entire P_2O_5 and K_2O 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** : 13.10.2015

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. Dr. K. V. Krishna Kumar, Sr. Scientist (Plant Pathology)
3. Dr. K. Veerabhadra Rao, Principal Scientist (Sugarcane)

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

The experiment conducted during 2014-15 with four existing and five ne isolates 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 of absent (restricted type), rind infection, sporulation over the rind and yellowing or drying of tops absent.

The data (Table-1) revealed that eight isolates of red rot fungus collected from Co 419, Co C 671, Co 997, 85 A 261, Co 62175, 81 V 48, 81 A 99 and Co A 09321 were tested on a set of 19 differential varieties during 2015-16. Variety - isolate interaction revealed that the isolates from 81 V 48 is similar to Cf 419, the isolates from Co 62175 and CoA 09321 is similar to Cf 671 and the isolate from 81 A 99 is similar to Cf 997. Thus, the present study confirmed the existence of four red rot pathotypes in Andhra Pradesh.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 programme of the year next to the reporting year:**

This experiment is being continued during 2016-17.

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

Nine isolates of red rot fungus collected from Co 419, Co C 671, Co 997, 85 A 261 (Co A 8908591 V 83, 86 V 96, Co 6275 and Co 6304 and 81 V 48 were tested on a set of 19 differential varieties during 2014-15. Variety - isolate interaction revealed that the isolates from 81 V 48 is similar to Cf 419, the isolates from 91 V 83, 86 V 96, Co 6275 and Co 6304 are similar to Cf 671. Thus, the present study confirmed the existence of four red rot pathotypes in Andhra Pradesh.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.

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.

X. **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 differential varieties to different red rot isolates (2015-2016)

S.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	Co 7805	Co 86002	Co 86032	CoV 92102	CoSe 95422
1.	CF 04	Co 419	S	S	S	S	S	R	S	R	R	R	R	R	S	R	S	S	I	S	R
2.	CF 05	Co 997	R	S	S	S	R	R	S	I	R	R	R	R	S	R	S	S	I	R	R
3.	CF 06	CoC 671	S	S	S	S	I	S	S	R	R	R	R	R	I	R	S	I	R	I	R
4.	CF 10	CoA 89085	S	S	S	I	S	S	S	I	R	R	R	R	R	R	I	I	I	I	R
5.	New isolate-1	Co 62175	S	S	S	S	I	S	S	S	R	R	R	R	R	R	I	S	S	S	R
6	New isolate-2	81 V 48	S	S	S	S	I	S	S	S	R	R	R	R	R	R	S	S	S	S	R
7	New isolate-3	81A 99	I	S	S	S	R	R	S	I	R	R	R	R	S	R	I	S	I	I	R
8	New isolate-4	CoA 09321	S	S	S	S	S	I	S	R	R	R	R	R	S	R	I	I	I	I	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**: 28

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.

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. 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.

Out of 20 entries tested during 2013-14 only five entries (Co 419, C0 C 671, Co 671, C0 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.

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

The technical programme of work for the year 2015-16 was discussed and finalized during Annual group meet of AICRP on sugarcane held at IISR, Lucknow, November, 2014.

VII. **Discipline wise technical report**

a. **Date of planting** : March 2015

b. **Varieties (24)** : Co 419, Co C 671, Co 997, 85 A 261, Co 6907, Co 7219, Co 7706, Co A 92081 (87 A 298), Co A 11326, Co A 12322 (2006 A 102), Co A 12321 (2006 A 64), Co 10336, Co A 11323, Co A 11321, Co A 13328, Co A 13325, Co A 13324, Co A 13326, Co A 13327, Co A 13322, Co A 13321, Co A 13323, Co V 13356 and Co 29094.

c. **Fertilizer application** : 112, 100 and 120 kg N, P_2O_5 and K_2O / ha respectively. Entire P_2O_5 and K_2O 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** : October 2015
2. **Plug method** : October 2015

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** : December, 2015

1. **Cotton swab method** : December, 2015
2. **Plug method** : December, 2015

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

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Dr. K. V. Krishna Kumar, Sr. Scientist (Plant Pathology)
3. Dr. K. Veerabhadra Rao, Principal Scientist (Sugarcane)

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

During 2014-15 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, C0 C 671, Co 671, C0 7219 and Co 86249) manifested top drying indicating its susceptibility and the remaining 15 entries reacted as resistant

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 –2.

It is evident from the results (Table-2) that out of 24 entries tested, 8 entries (Co 419, C0C 671, Co 997, 85 A 261, Co 6907, CoA 11323, CoA 13324 and Co 13327) manifested top drying indicating its susceptibility and the remaining 16 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 – 3.

Results presented in table – 3 revealed that out of 24 varieties / genotypes tested by plug method of inoculation five entries (Co A 12321, Co A 12322, Co A 11321, Co A 13325 and Co A 92081) showed resistance while 5 entries Co A 11326, Co A 13328, CoA 13321, CoA 13322 and Co V 13356 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05 (Table-3)**.**

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

This experiment is being continued during 2016-17.

IX. Technical summary of the individual report:

Twenty four 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 24 entries tested, 8 entries (Co 419, C0C 671, Co 997, 85 A 261, Co 6907, CoA 11323, CoA 13324 and Co 13327) manifested top drying indicating its susceptibility and the remaining 16 entries reacted as resistant to Cf 04, Cf 05 and Cf 06. out of 24 varieties / genotypes tested by plug method of inoculation five entries (Co A 12321, Co A 12322, Co A 11321, Co A 13325 and Co A 92081) showed resistance while 5 entries Co A 11326, Co A 13328, CoA 13321, CoA 13322 and Co V 13356 showed moderately resistant reaction to Cf 04, Cf 06 and Cf 05.

X. Salient findings:

Twenty four 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 24 entries tested, 8 entries (Co 419, C0C 671, Co 997, 85 A 261, Co 6907, CoA 11323, CoA 13324 and Co 13327) manifested top drying indicating its susceptibility and the remaining 16 entries reacted as resistant to Cf 04, Cf 05 and Cf 06. out of 24 varieties / genotypes tested by plug method of inoculation five entries (Co A 12321, Co A 12322, Co A 11321, Co A 13325 and Co A 92081) showed resistance while 5 entries Co A 11326, Co A 13328, CoA 13321, CoA 13322 and Co V 13356 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 Cotton swab method at 60 days after inoculation (2015-2016)

S.No	Clone	Cf 419		Cf 671		Cf 997	
		Score	Reaction	Score	Reaction	Score	Reaction
1.	Co 419	8.4	S	8.6	S	8.3	S
2.	Co C 671	8.8	S	8.2	S	8.6	S
3	Co 997	8.3	S	8.1	S	8.6	S
4	85 A 261	8.2	S	8.1	S	8.4	S
5	Co 6907	8.3	S	8.6	S	8.4	S
6	Co 7219	0.0	R	0.0	R	0.0	R
7	Co 7706	0.0	R	0.0	R	0.0	R
8	Co A 92081 (87 A 298)	0.0	R	0.0	R	0.0	R
9	Co A 11326	0.0	R	0.0	R	0.0	R
10	Co A 12322 (2006 A 102)	0.0	R	0.0	R	0.0	R
11	Co A 12321 (2006 A 64)	0.0	R	0.0	R	0.0	R
12	Co 10336	0.0	R	0.0	R	0.0	R
13	Co A 11323	8.4	S	8.1	S	8.3	S
14	Co A 11321	0.0	R	0.0	R	0.0	R
15	Co A 13328	0.0	R	0.0	R	0.0	R
16	Co A 13325	0.0	R	0.0	R	0.0	R
17	Co A 13324	8.3	S	8.2	S	8.1	S
18	Co A 13326	0.0	R	0.0	R	0.0	R
19	Co A 13327	8.1	S	8.1	S	8.4	S
20	Co A 13322	0.0	R	0.0	R	0.0	R
21	Co A 13321	0.0	R	0.0	R	0.0	R
22	Co A 13323	0.0	R	0.0	R	0.0	R
23	Co V 13356	0.0	R	0.0	R	0.0	R
24	Co 29094	0.0	R	0.0	R	0.0	R

Table 3: Reaction of varieties / genotypes to the three pathotypes of red rot fungus by Plug method at 60 days after inoculation (2015-2016)

S.No	Clone	Cf 4 19		Cf 671		Cf 997	
		Score	Reaction	Score	Reaction	Score	Reaction
1.	Co 419	8.6	HS	8.6	HS	8.6	HS
2.	Co C 671	8.6	HS	8.5	HS	8.6	HS
3	Co 997	8.7	HS	8.8	HS	8.5	HS
4	85 A 261	8.2	HS	8.6	HS	8.1	HS
5	Co 6907	8.4	HS	8.2	HS	8.6	HS
6	Co 7219	8.3	HS	8.1	HS	8.7	HS
7	Co 7706	8.2	HS	8.6	HS	8.9	HS
8	Co A 92081 (87 A 298)	2.0	R	1.8	R	1.8	R
9	Co A 11326	3.4	MR	1.8	R	1.2	R
10	Co A 12322 (2006 A 102)	2.0	R	1.9	R	3.2	MR
11	Co A 12321 (2006 A 64)	2.0	R	1.9	R	3.2	MR
12	Co 10336	8.6	HS	8.2	HS	8.6	HS
13	Co A 11323	8.8	HS	8.3	HS	8.6	HS
14	Co A 11321	2.0	R	3.3	MR	3.7	MR
15	Co A 13328	3.4	MR	3.6	M6	3.4	MR
16	Co A 13325	1.6	R	1.8	R	1.6	R
17	Co A 13324	8.6	HS	8.8	HS	8.6	HS
18	Co A 13326	8.6	HS	8.6	HS	8.8	HS
19	Co A 13327	8.6	HS	8.8	HS	8.6	HS
20	Co A 13322	2.8	MR	3.2	MR	3.6	MR
21	Co A 13321	3.6	MR	3.4	MR	3.0	MR
22	Co A 13323	8.6	HS	8.8	HS	8.6	HS
23	Co V 13356	2.8	MR	3.2	MR	3.0	MR
24	Co 29094	4.4	MS	3.8	MR	4.4	MS

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**: 21

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.

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

The technical programme of work for the year 2015-16 was discussed and finalized during Annual group meet of AICRP on sugarcane held at IISR, Lucknow, November, 2014.

VII. **Discipline wise technical report**

a. **Date of planting** : February 2014

b. **Varieties (24)** : Co 419, Co C 671, Co 997, 85 A 261, Co 6907, Co 7219, Co 7706, Co A 92081 (87 A 298), Co A 11326, Co A 12322 (2006 A 102), Co A 12321 (2006 A 64), Co 10336, Co A 11323, Co A 11321, Co A 13328, Co A 13325, Co A 13324, Co A 13326, Co A 13327, Co A 13322, Co A 13321, Co A 13323, Co V 13356 and Co 29094.

c. **Fertilizer application** : 112, 100 and 120 kg N, P_2O_5 and K_2O / ha respectively. Entire P_2O_5 and K_2O 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, 2015

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 dired and teliospores collected by scraping and sieving. The smut spore powder so collected was packed in butter paper covers which were stored in a desiccators 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. Dr. K.V. Krishna Kumar, Sr. Scientist (Plant Pathology)
3. Dr. K. Veerabhadra Rao, Principal Scientist (Sugarcane)

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

Out of 20 varieties / genotypes tested during 2013-14, 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.
During 2014-15 out of 17 varieties / genotypes tested, none of the entries showed resistant reaction while one entry (CoOr 12346) exhibited resistant reaction, while Co 997 reacted as moderately resistant, three entries (Co A 11321, Co A 11325 and Co C 11336) reacted as moderately susceptible. The remaining 12 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 24 varieties / genotypes tested, six entries showed resistant reaction (CoA 13328, CoA 13325, CoA 13324, CoA 13326, CoV 13356 and Co 29094) while five entries Co 997, Co 7706, CoA 13327, CoA 13322 and CoA 13321 reacted as moderately resistant. The remaining entries showed Moderately susceptible, susceptible to highly susceptible reaction.

VIII. **Technical programme of the year next to the reporting year:**
This experiment is being continued during 2016-17

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

Out of 24 varieties / genotypes tested, six entries showed resistant reaction (CoA 13328, CoA 13325, CoA 13324, CoA 13326, CoV 13356 and Co 29094) while five entries Co 997, Co 7706, CoA 13327, CoA 13322 and CoA 13321 reacted as moderately resistant.

X. **Salient findings:**

out of 24 varieties / genotypes tested, six entries showed resistant reaction (CoA 13328, CoA 13325, CoA 13324, CoA 13326, CoV 13356 and Co 29094) while five entries Co 997, Co 7706, CoA 13327, CoA 13322 and CoA 13321 reacted as moderately resistant.

Table 4: Reaction of varieties / genotypes to smut (2015- 2016)

S.No.	Variety / genotype	Percent sett Germination	Percent smut incidence	Reaction
1.	Co 419	86	38.6	HS
2.	CoC 671	62	22.5	MS
3.	Co 997	76	6.2	MR
4.	85 A 261	92	61.4	HS
5.	Co 6907	82	54.7	HS
6.	Co 7219	68	48.6	HS
7.	Co 7706	66	5.4	MR
8.	87 A 298	78	86.7	HS
9.	Co A 11326	92	38.2	HS
10.	Co A 12322 (2006 A 102)	72	36.3	HS
11.	Co A 12321 (2006 A 64)	52	31.8	HS
12.	Co 10336	46	24.3	S
13	Co A 11323	48	27.3	S
14	CoA 11321	58	24.2	S
15	CoA 13328	80	1.2	R
16	CoA 13325	60	2.4	R
17.	CoA 13324	78	2.8	R

18.	CoA 13326	76	0.0	R
19.	CoA 13327	78	6.4	MR
20.	CoA 13322	64	8.8	MR
21.	CoA 13321	72	7.4	MR
22.	CoA 13323	70	2.8	MS
23.	CoV 13356	60	2.6	R
24.	Co 29094	60	4.4	R

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

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**: 05

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 2015-16 was discussed and finalized during Annual group meet of AICRP on sugarcane held at IISR, Lucknow, November, 2014.

VII. **Discipline wise technical report**

a. **Date of planting** : February 2015

b. **Varieties (24)** : Co 419, Co C 671, Co 997, 85 A 261, Co 6907, Co 7219, Co 7706, Co A 92081 (87 A 298), Co A 11326, Co A 12322 (2006 A 102), Co A 12321 (2006 A 64), Co 10336, Co A 11323, Co A 11321, Co A 13328, Co A 13325, Co A 13324, Co A 13326, Co A 13327, Co A 13322, Co A 13321, Co A 13323, Co V 13356 and Co 29094.

c. **Fertilizer application** : 112, 100 and 120 kg N, P_2O_5 and K_2O / ha respectively. Entire P_2O_5 and K_2O 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, 2016

i. **Method of inoculation** : Plug method

j. **Inoculum** : Cane growing areas of the state visited during July-August, 2015 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 expect 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. Dr. K.V. Krishna Kumar, Sr. Scientist (Plant Pathology)
3. Dr. K. Veerabhadra Rao, Principal Scientist (Sugarcane)

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

Out of 24 varieties / genotypes tested during 2012-13, 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.

During 2013-14 twenty 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.

Out of 17 varieties / genotypes tested during 2014-15, seven entries (Co A 12321, Co A 12322, Co A 11323, Co A 11326, Co C 11336, CoOr 12346 and Co A 92081) showed resistant reaction while two entries (Co A 12323 and Co A 12324) reacted as moderately resistant.

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 24 varieties / genotypes tested, two entries (Co A 13325 and CoA 13321) showed resistant reaction while seven entries (Co 7706, CoA 12321, CoA 11323, CoA 13328, CoA 13324, CoA 13322 and Co 29094) reacted as moderately resistant. The remaining showed susceptible to highly susceptible reaction.

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

This experiment is being continued during 2015-16.

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

Out of 24 varieties / genotypes tested, two entries (Co A 13325 and CoA 13321) showed resistant reaction while seven entries (Co 7706, CoA 12321, CoA 11323, CoA 13328, CoA 13324, CoA 13322 and Co 29094) reacted as moderately resistant.

X. **Salient findings:**

Out of 24 varieties / genotypes tested, two entries (Co A 13325 and CoA 13321) showed resistant reaction while seven entries (Co 7706, CoA 12321, CoA 11323, CoA 13328, CoA 13324, CoA 13322 and Co 29094) reacted as moderately resistant.

Table 5: Reaction of varieties / genotypes to wilt during 2015- 2016 by plug method of inoculation.

S. No	Varieties	Germination count At 45 DAP	Mean wilt severity index	Reaction
1.	Co 419	74	4.8	HS
2.	CoC 671	78	4.4	HS
3.	Co 997	83	4.2	HS
4.	85 A 261	88	3.8	S
5.	Co 6907	72	4.6	HS
6.	Co 7219	68	3.2	S
7.	Co 7706	84	1.6	MR
8.	87 A 298	94	2.8	MS
9.	Co A 11326	82	3.4	S
10.	Co A 12322 (2006 A 102)	84	2.6	MS
11.	Co A 12321 (2006 A 64)	92	1.8	MR
12.	Co 10336	70	2.4	MS
13	Co A 11323	76	1.2	MR
14	CoA 11321	84	3.4	S
15	CoA 13328	64	1.2	MR
16	CoA 13325	74	0.6	R
17.	CoA 13324	88	1.2	MR
18.	CoA 13326	72	4.6	HS
19.	CoA 13327	74	2.2	MS
20.	CoA 13322	84	1.6	MR
21.	CoA 13321	88	0.6	R
22.	CoA 13323	90	4.2	HS
23.	CoV 13356	84	2.8	MS
24.	Co 29094	78	1.6	MR

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

I **Project No.** : PP 7 (d)

II **Project title** : Evaluation of genotypes for resistance to YLD

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:**

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

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

The technical programme of work for the year 2015-16 was discussed and finalized during Annual group meet of AICRP on sugarcane held at IISR, Lucknow, November, 2014.

VII. **Discipline wise technical report**

a. **Date of planting** : March 2015

b.

Varieties : (51)

Co 419, CoC 671, Co 997, 85 A 261, Co 6907, Co 7219, Co 7706, 87 A 298, Co A 11326, 2006 A 102, 2006 A 64, Co 10336, Co A 11323, CoA 11321, 2011 A 175, CoV 92102, 2011 A 78, 2011A 11, 2011 A 319,2011 A 67, 2011 A 252, 2011 A 313, 2011 A 259, CoA 13328, CoA 13325, CoA 13324, CoA 13326, CoA 13327, CoA 13322, CoA 13321, CoA 13323, 2011 A 67, 2011 A 262, 2011 A 260, 2011 A 294, 2011 A 113, 2012 A 287, 2012 A 246, 2012 A 279, 2012 A 335, 2012 A 149, 2012 A 23, 2012 A 340, 2012 A 145, 2012 A 264, 2012 A 249, 2012 A 319, 2012 A 277, CoV 13356, Co 29094 and 2011 A 255.

c. **Fertilizer application** : 112, 100 and 120 kg N, P_2O_5 and K_2O / ha respectively. Entire P_2O_5 and K_2O were applied as basal dose. N fertilizer (Urea) was applied two equal splits at 45 and 90 days after planting.

d. Techniques to be adopted.

a. Treatments.

Two budded setts of test entries from short crop

b. Varieties

Genotypes included in zonal varietal trial, preliminary yield trial and initial evaluation trial will be tested for two years

c. Design	Each entry will be planted in two rows of 5 m. length placed at 0.8 m. apart.
d. Replications	Non - replicated.
e. Plot size	Gross and net 8.0 Sq. m. / Variety (Two rows of 5 m length)
f. Spacing	80 cm. between two adjacent rows.
g. Seed rate	Twenty five (two budded) setts / row of 5 m length.
h. Fertilizers	112,100,120 kg N, P_2O_5 and K_2O per hectare. P_2O_5 and K_2O will be applied as basal dose. N fertilizer will be applied in two equal split doses at 45 and 90 days after planting.
i. Irrigations	Once in six days during summer and need based later.

j. Period of harvest January, 2016
k. Season : 2015-2016
e. Inoculation methodology : Natural incidence

13. Duration Recurring study; promising entries will be screened for 3 years.

14. Data to be collected

YLD severity grades:

Disease grade	Description
0	No symptom of the disease
1	Mild yellowing of midrib in one or two leaves, no sign of typical bunching of leaves caused by YLD
2	Prominent yellowing of midrib on all the leaves in the crown. No bunching of leaves
3	Progress of midrib yellowing to laminar region in the whorl, yellowing on the upper leaf surface, and bunching of leaves
4	Drying of laminar region from leaf tip downwards along the midrib, typical bunching of leaves as a tuft
5	Stunted growth of the cane combined with drying of symptomatic leaves

Mean of the severity grades to be computed and the following YLD severity scale is to be used to assign disease reaction of the variety.

YLD severity scale :

Score	Disease reaction
0.0 - 1.0	Resistant
>1.0 – 2.0	Moderately resistant
>2.0 – 3.0	Moderately susceptible
>3.0 – 4.0	Susceptible
>4.0 – 5.0	Highly susceptible

Symptoms of Yellow Leaf Disease displaying different severity grades

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

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Dr. K.V. Krishna Kumar, Sr. Scientist (Plant Pathology)
3. Dr. K. Veerabhadra Rao, Principal Scientist (Sugarcane)

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

Out of 52 varieties / genotypes screened during 2014-15 one variety 2006 A 64 showed resistant reaction against YLD under natural conditions, while four entries 2011 A 259, 2011 A 313, 2011 A 262 and 2011 A 294 recorded moderately resistant reaction and remaining are susceptible.

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

Out of 51 varieties / genotypes two varieties Co A 12321 (2006 A 64) and Co A 12322 (2006 A 102) showed resistant reaction against YLD under natural conditions, while ten entries Co 7219, 2011 A 259, 2011 A 313, 2011 A 262, 2011 A 294, 2012 A 145, 2012 A 264, Co A 13326, Co A 13321 and Co A 13323 recorded moderately resistant reaction and remaining are susceptible.

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

This experiment will be concluded during 2016-17.

IX. Technical summary of the individual report:

Out of 51 varieties / genotypes two varieties Co A 12321 (2006 A 64) and Co A 12322 (2006 A 102) showed resistant reaction against YLD under natural conditions, while ten entries Co 7219, 2011 A 259, 2011 A 313, 2011 A 262, 2011 A 294, 2012 A 145, 2012 A 264, Co A 13326, Co A 13321 and Co A 13323 recorded moderately resistant reaction.

X. Salient findings:

Out of 51 varieties / genotypes two varieties CoA 12321 (2006 A 64) and Co A 12322 (2006 A 102) showed resistant reaction against YLD under natural conditions, while ten entries Co 7219, 2011 A 259, 2011 A 313, 2011 A 262, 2011 A 294, 2012 A 145, 2012 A 264, CoA 13326, CoA 13321 and CoA 13323 recorded moderately resistant reaction

Table 14: Reaction of sugarcane clones for resistance to YLD (2015-16)

S. No	Varieties	Mean YLD severity index	Reaction
1.	Co 419	3.8	S
2.	CoC 671	3.4	S
3.	Co 997	4.6	HS
4.	85 A 261	3.2	S
5.	Co 6907	2.5	MS
6.	Co 7219	1.2	MR
7.	Co 7706	4.6	HS
8.	87 A 298	3.8	S
9.	Co A 11326	2.4	MS
10.	Co A 12322 (2006 A 102)	0.6	R
11.	Co A 12321 (2006 A 64)	0.8	R
12.	Co 10336	3.2	S
13	Co A 11323	3.6	S
14	CoA 11321	3.3	S
15	2011 A 175	2.2	MS
16	CoV 92102	3.4	S
17.	2011 A 78	2.8	MS
18.	2011A 11	2.6	MS
19.	2011 A 319	3.4	S
20.	2011 A 67	2.4	MS
21.	2011 A 252	2.4	MS
22.	2011 A 313	1.7	MR
23.	2011 A 259	1.3	MR
24.	CoA 13328	2.5	MS
25	CoA 13325	2.8	MS
26	CoA 13324	3.5	S
27	CoA 13326	1.4	MR
28	CoA 13327	2.2	MS

29	CoA 13322	2.5	MS
30	CoA 13321	1.3	MR
31	CoA 13323	1.7	MR
32	2011 A 67	2.4	MS
33	2011 A 262	1.2	MR
34	2011 A 260	2.4	MS
35	2011 A 294	1.6	MR
36	2011 A 113	2.8	MS
37	2012 A 287	4.6	HS
38	2012 A 246	3.8	S
39	2012 A 279	4.4	HS
40	2012 A 335	4.8	HS
41	2012 A 149	2.2	MS
42	2012 A 23	2.6	MS
43	2012 A 340	2.2	MS
44	2012 A 145	1.8	MR
45	2012 A 264	1.2	MR
46	2012 A 249	4.6	HS
47	2012 A 319	4.2	HS
48	2012 A 277	2.6	MS
49	CoV 13356	3.4	S
50	Co 29094	2.2	MS
51	2011 A 255	2.2	MS

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**: 27

IV. **Location** : A general survey was conduced 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 2015-16 was discussed and finalized during Annual group meet of AICRP on sugarcane held at IISR, Lucknow, November, 2014.

VII. **Discipline wise technical report**

a) Name and designation of the participating scientist:

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Dr. K.V. Krishna Kumar, Sr. Scientist (Plant Pathology)
3. Dr. K. Veerabhadra Rao, Principal Scientist (Sugarcane)

b) Results obtained during previous year:

During 2013-14 Red rot, smut, yellow leaf disease, grassy shoot, top rot, ring spot, rust and wilt diseases were recorded on sugarcane.

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

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. Red rot 10-40 % incidence was observed on Co 62175, 81 A 99, 93 V 297 and 81 V 48 in Visakhapatnam and East Godavari districts. Compared to 2013-14 the cultivation of Co 62175 was reduced due to severe incidence of red rot during 2011-12 in Srikakulam Dt. But this year also noticed the red rot incidence where the farmers who were growing ratoon crop of Co 62175, 81 V 48 and 81 A 99.

Smut disease incidence was noticed in all most all sugarcane growing areas of Andhra Pradesh ranging from 10-35 % mostly on ratoon crop of Co A 92081,CoV 09356 (2003V46), 91 V 83 . Wilt incidence also was observed 10-30 % in Coastal areas of Andhra Pradesh on Co 8368, 87 A 380, Co7219, 91 V 83, CoA 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. During 2015- 16 the incidence is 10- 70 % in East Godavari and Visakhapatnam dt.

Rust, ring spot and GSD are predominant diseases recorded during the period 2015-16 on sugarcane. 10 -20 % rust and ring spot incidence is observed in some areas even after 2-3 months after planting and also increasing their incidence year after year.

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

The experiment is being continued during 2016-17.

Table: 6 -Natural Occurrence of sugarcane diseases in Andhra Pradesh during 2015-2016

Disease	Name of area surveyed	% disease incidence (Clump basis)	Varieties affected	Crop stage when observed	Any other information
Red rot	Nagulapalli, Achutapuram, Kothuru, Munagapaka (Visakhapatnam Dt)	20-40	81A 99 81 V 48	Grand growth stage	Ratoon crop
	Chodavaram, Narsipatnam, Tandava, Etikoppaka (Visakhapatnam Dt)	10-35	81A 99 81 V 48 Co 62175	Grand growth stage	Water logging conditions
	Samalkot, Elaswaram, yerravarm, Chelluru (East Godavari dt)	10-20	93 V 297 8 V 48	Grand growth stage	Ratoon crop and water logging conditions
Smut	Bobbili, Salur, Gajapatinagaram (Vijayanagaram Dt)	20-35	CoA 92081	Grand growth stage	More during April to June And ratoon crop
	Nagulapalli, Achutapuram, Kothuru, Munagapaka (Visakhapatnam Dt)	25- 30	Co6907 Co A 92081	Tillering to cane formation	

	Mukundapuram, Sankili (Srikakulam Dt)	20-30	CoA 92081 CoA 99082 (93 A145)	Tillering to cane formation	
	Samalkot, Elaswaram, yerravarm, Chelluru (East Godavari dt)	20-30	Co A 92081, CoV 09356 (2003V46), 91 V 83	Tillering	
	Tallapalem, Chodavaram, Narsipatnam, Tandava, Etikoppaka (Visakhapatnam Dt)	10-35	Co6907 Co A 92081	Grand growth stage	
Wilt	Bobbili, Salur, Gajapatinagaram (Vijayanagaram Dt)	10-20	Co 8368 87 A 380 Co7219	Grand growth stage	Ratoon crop
	Samalkot, Elaswaram, yerravarm, Chelluru (East Godavari dt)	10-15	91 V 83	Grand growth stage	Ratoon crop
	Chodavaram, Narsipatnam, Tandava, Etikoppaka (Visakhapatnam Dt)	20- 30	CoA 92081 81 A99	Grand growth stage	Ratoon crop
YLD	Bobbili, Salur, Gajapatinagaram, Cheepurupalli, Ranastalam, Rajam, Terlam , Nemalam (Vijayanagaram Dt)	10-30	CoA 92081, Co 86032, Co 8368, CoV 09356 (2003V46)	Grand growth stage	Drought situation followed by heavy rains Ratoon crop and water logging conditions
	Nagulapalli, chutapuram, Chodavaram, Munagapaka, Etikoppaka (Visakhapatnam Dt)	15-35	Co6907, 2001 A 63, Co A 9208, Co6907	Grand growth stage	
	Samalkot, Elaswaram, yerravarm, Chillangi, Velanki, Kattamuru, Peravaram (East Godavari dt)	30-35	Co A 92081, 86 V 15 2003V46, 2001 A 63 91 V 83, CoV 92102	Grand growth stage	
	Chelluru, Muramanda, Dulla	40-60	2003 V 46, 87 A 298, 98 A 22, 87 A 380, 86 V 96.	Grand growth stage	

	Bheemasinghi, Bobbili	50- 70	Co A 92081, 2003V46.	Grand growth stage	
GSD	Nagulapalli, Achutapuram, Kothuru, Munagapaka (Visakhapatnam Dt)	50-60	C0 7219 CoA 92081	Tillering	More severe in ratoons
	Samalkot, Elaswaram, yerravarm, Chelluru (East Godavari dt)	10-20	Co A 92081, CoV 09356 2003V46	Ratoons	Tillering
Rust and Ring spot	Bobbili, Salur, Gajapatinagaram (Vijayanagaram Dt)	10-15	CoA 92081	Grand growth stage	Increased during November
	Nagulapalli, Achutapuram, Kothuru, Munagapaka (Visakhapatnam Dt)	50-60	Co6907, C0 7219 CoA 92081	Tillering to cane formation	
	Samalkot, Elaswaram, yerravarm, Chelluru (East Godavari dt)	30-50	CoA 92081 CoA 99082 (93 A145) Co86032, CoA 06321 (2001A63) 2003V46	Grand growth stage	
	Mukundapuram (Srikakulam Dt)	10-15	CoA 92081	Grand growth stage	

I **Project No.** : PP 31

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

III. **Serial number of the year of experimentation**: 04

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 2015-16 was discussed and finalized during Annual group meet of AICRP on sugarcane held at IISR, Lucknow, November, 2014.

VII. **Discipline wise technical report**

a. **Date of planting** : March 2015

b. **Varieties (24)** : Co 419, Co C 671, Co 997, 85 A 261, Co 6907, Co 7219, Co 7706, Co A 92081 (87 A 298), Co A 11326, Co A 12322 (2006 A 102), Co A 12321 (2006 A 64), Co 10336, Co A 11323, Co A 11321, Co A 13328, Co A 13325, Co A 13324, Co A 13326, Co A 13327, Co A 13322, Co A 13321, Co A 13323, Co V 13356 and Co 29094.

c. **Fertilizer application** : 112, 100 and 120 kg N, P_2O_5 and K_2O / ha respectively. Entire P_2O_5 and K_2O 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** : March, 2015

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

1. Dr. N. Raj Kumar, Scientist (Plant Pathology)
2. Dr. K.V. Krishna Kumar, Sr. Scientist (Plant Pathology)
3. Dr. K. Veerabhadra Rao, Principal Scientist (Sugarcane)

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

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.
During 2014-15 out of 17 varieties / genotypes were screened against top rot disease under natural conditions two entries/varieties (Co C 671 and Co A 12323) showed highly susceptible reaction while three entries Co A 11326, Co 419 and Co 997) exhibited susceptible reaction to top rot disease.

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

Screening: Results presented in table – 9 revealed that out of 24 varieties / genotypes were screened against top rot disease under natural conditions one entries/varietiy (Co C 671) showed highly susceptible reaction while two entries (Co 419 and Co 997) exhibited susceptible reaction to top rot disease and remaining entries screened were resistant.
Management: Results presented in table – 10 revealed that Sett treatment + Foliar spray- Carbendaizim -0.05% showed the highest percent germination and also low disease incidence of toprot disease (84.16 and 5.84 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 2016-17.

IX. Technical summary of the individual report:

Screening: Out of 24 varieties / genotypes were screened against top rot disease under natural conditions one entries/varietiy (Co C 671) showed highly susceptible reaction while two entries (Co 419 and Co 997) exhibited susceptible reaction to top rot disease and remaining entries screened were resistant.
Management: Sett treatment + Foliar spray- Carbendaizim -0.05% showed the highest percent germination and also low disease incidence of toprot disease (84.16 and 5.84 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:

Screening: Out of 24 varieties / genotypes were screened against top rot disease under natural conditions one entries/varietiy (Co C 671) showed highly susceptible reaction while two entries (Co 419 and Co 997) exhibited susceptible reaction to top rot disease and remaining entries screened were resistant.

Management: Sett treatment + Foliar spray- Carbendaizim -0.05% showed the highest percent germination and also low disease incidence of toprot disease (84.16 and 5.84 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.

Table: 9 – Reaction of Sugarcane clones for resistance to top rot (20015-2016)

S. No	Varieties	Per cent infected plants				Reaction
		Mild	Moderate	Severe	Total incidence	
1.	Co 419	19	6	2	27	S
2.	Co C 671	17	8	6	32	HS
3.	Co 997	13	7	4	24	S
4.	85 A 261	0	0	0	0	R
5.	Co 6907	3	2	0	5	R
6.	Co 7219	2	2	0	4	R
7.	Co 7706	3	0	0	3	R
8.	Co A 92081 (87 A 298)	0	0	0	0	R
9.	Co A 11326	0	1	1	2	R
10.	Co A 12321 (2006 A 64)	0	0	0	0	R
11.	Co A 12322 (2006 A 102)	0	0	0	0	R
12.	Co 10336	0	0	0	0	R
13.	Co A 11323	3	2	0	5	R

14	CoA 11321	0	3	1	4	R
15.	CoA 13328	6	2	2	10	MR
16.	CoA 13325	4	2	0	6	R
17.	CoA 13324	0	0	2	2	R
18	CoA 13326	2	1	0	3	R
19	CoA 13327	0	0	1	1	R
20	CoA 13322	3	1	1	5	R
21	CoA 13321	4	1	0	5	R
22	CoA 13323	0	1		2	R
23	CoV 13356	2	1	0	3	R
24	Co 29094	0	1	1	2	R

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

Table: 10 Management of toprot disease in sugarcane during 2015-16

Treatments		**Germination (%)**	**Disease incidence**
T1	Sett treatment- Overnight soaking with carbendaizim- 0.1% a.i	78.4	16.22
T2	Foliar spray- Carbendaizim -0.05% a.i (3 sprays at 15 days interval from May 15th)	82.3	12.63
T3	**Sett treatment (T1) + Foliar spray- Carbendaizim -0.05% (T2)**	86.1	4.21
T4	Control	71.5	36.27
	SE+	2.12	3.11
	CD at 5 %	3.03	7.91
	C.V. %	6.21	14.32

Table: 11- Weather data and top rot incidence at RARS, Anakapalle during crop growth Period of sugarcane during 2015-16

Month	Total rainfall (mm)		No. of rainy days	Temp. ^{o}C		RH %		Bright sunshine hrs.	Wind velocity (km.ph)	Evaporation (mm)	Top rot (PDI)
	Normal	Actual		Max	Min.	FN	AN				
Mar, 2015	23.1	000.0	0	35.7	23.2	85	44	7.7	3.6	5.6	0.0
April, 2015	32.3	087.0	4	35.7	25.9	82	42	7.1	4.9	6.1	0.0
May, 2015	84.3	027.6	2	37.6	27.7	83	45	7.9	4.3	6.1	2.6
June, 2015	110.6	279.4	15	33.4	26.0	88	59	3.2	2.8	3.7	8.8
July, 2015	113.8	190.2	10	35.3	26.5	84	53	4.1	2.3	4.5	18.2
Aug, 2015	183.7	306.8	10	34.1	25.7	87	70	4.8	2.0	3.8	28.7
Sept, 2015	211.6	293.0	11	34.1	25.7	90	57	3.6	1.3	3.0	26.5
Oct 2015	200.7	026.0	4	35.2	24.9	87	66	6.3	1.0	3.7	13.4
Nov,2015	118.2	135.0	4	30.9	23.3	85	69	5.4	1.1	3.1	3.8
Dec, 2015	022.2	000.0	4	31.0	24.7	92	58	6.4	1.0	3.2	0.0
Jan, 2016	005.8	000.0	0	30.5	20.9	91	48	6.2	0.7	3.2	0.0
Feb, 2016	014.0	000.0	0	33.2	23.1	91	47	7.2	1.9	4.4	0.0

Correlation matrix:

	Rain (mm)	***Rainy days***	***MaxT***	***Min T***	***RH I***	***RH II***	***Wind vel***	***BSSH***	***Evaporation mm***	***PDI***
Rain mm	1	9.00	0.071	0.606	0.034	0.929	-0.701	-0.787	-0.560	0.963
Rainy days	0.900	1	0.181	0.717	-0.001	0.944	-0.773	-0.936	-0.468	0.859
MaxT	0.071	0.181	1	0.765	-0.758	-0.010	-0.066	-0.124	0.754	-0.113
Min T	0.606	0.717	0.765	1	-0.641	0.608	-0.580	-0.661	0.200	0.432
RH I	0.034	-0.001	-0.758	-0.641	1	0.045	0.154	0.069	-0.641	0.256
RH II	0.929	0.944	-0.010	0.608	0.045	1	-0.790	-0.894	-0.629	0.879
Wind vel	-0.701	-0.773	-0.066	-0.580	0.154	-0.790	1	0.730	0.390	-0.616
BSSH	-0.787	-0.936	-0.124	-0.661	0.069	-0.894	0.730	1	0.478	-0.738
Evaporation mm	-0.560	-0.468	0.754	0.200	-0.641	-0.629	0.390	0.478	1	-0.693
PDI	0.963	0.859	-0.113	0.432	0.256	0.879	-0.616	-0.738	-0.693	1

Table No. 12: Regression equations for top rot of sugarcane (with significant variables) at RARS, Anakapalle during crop growth period of sugarcane from 2011-12 to 2015-16.

Multiple regression	Equation	R^{*}	Adj $R^{2@}$
Linear	Average PDI =24.79 + 0.15*Rainfall + 0.88*RD+ .83*Min Temp+ 0.73*RH I- 1.27*RH II	0.946	0.996
*Adj R^2 : Adjusted coefficient of determination @R : Coefficient of correlation			

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