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**ALL INDIA CO-ORDINATED RESEARCH PROJECT  
ON SUGARCANE, KOLHAPUR.**

**ANNUAL REPORT  
2012- 2013**

Sponsored by

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

NEW DEHLI – 110 010.

**Submitted by**

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**PLANT PATHOLOGY**

**REGIONAL SUGARCANE AND JAGGERY RESEARCH STATION,**

**KOLHAPUR - 416 005.**

**MAHATMA PHULE KRISHI VIDYAPEETH, RAHURI**

**( MAHARASHTRA)**

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### Weather Condition during the year 2012-13

The Regional Sugarcane and Jaggery Research Station, Kolhapur is geographically situated at an elevation of 574 meter above the sea level on 16°43' North latitude and 74°13' East longitude. It comes under the Sub-Montane Zone of Maharashtra. The weather parameters during the seasonal crop growth period from December, 2011 to February, 2013 are presented in Table 1 and 2.

The planting of seasonal sugarcane was completed in second fortnight of December 2011 to January 2012. During germination phase of sugarcane the maximum and minimum temperature were 30.6°C and 14.6°C, respectively with average humidity of 79.0 %. This was favorable condition for good germination. The tillering phase was completed in the month of February 2012 to April 2012. The maximum temperature 34.9°C and minimum 17.8 °C with highest humidity 78.5 % which was solicited for tillering phase.

There was even distribution of rains during the monsoon season. During early growth and grand growth of crop the total rainfall received was 122.5 and 581.7 mm respectively. There was no flood situation in this year.

There was summer showers (26.2 mm) in the month of April (14 to 18 MW) which was favoured for the growth of tillers. The rainfall received during the month of May and June, 2012 (122.5 mm in 9 rainy days) was less 55.81% as compared to average rainfall of last five years (277.22 mm). However, the intermittent rainy showers during July to September favoured luxuriant growth of crop. Besides this, the crop was irrigated for obtaining desirable crop growth particularly in May, 2012.

The lowest average bright sunshine hrs. (1.7) was recorded in 27 to 31 MW particularly during grand growth period, but, the crop growth was not much affected. Overall, during crop life span, the total bright sunshine hours were not much less as compared to previous last five years. This situation was favoured to increase the yield to some extent in the zone.

The maturity phase of crop was started from 45 MW of 2012 to 05 MW of 2013. The average maximum temperature 31.3<sup>0</sup> C and minimum temperature 16.9<sup>0</sup> C with 82.0 % humidity were observed.

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During the maturity period of sugarcane even distribution of rains during monsoon, no late showers (post monsoon) and longer period of winter season with cool temperature reflected on late flowering and high recovery in the zone as compared to last year.

The incidence of early shoot borer was observed in late planted crop (after 15<sup>th</sup> February ) and late ratoon, hence, required to undertake plant protection measures for control of early shoot borer during tillering phase of sugarcane. In grand growth period, the incidence of White Wooly Aphid was noticed more in some part of submontane zone (Chandgad, Gadhinglaj and Ajara), whereas, white fly was noticed less as compared to previous years. The incidence of white grub (*Leucopholis* and *Holotricha spp.*) is increasing day by day in the region.

The incidence of Pokkah boeng was noticed in May, 2012 after receiving summer showers (pre monsoon). Rust and Ring spot, these fungal diseases have been occurred every year with high intensity during monsoon period. Besides this, the outbreak of brown spot with high intensity in the region since last year is a threaten to sugarcane crop particularly CoM 0265 variety. Another viral disease yellow leaf is increased from grand growth period on Co 86032. Therefore it is necessary to procure and multiply pure seed material by following thermotherapy method.

The total rainfall of 843.9 mm in 64 rainy days was received during the year 2012, which was less than normal rainfall (1011.00 mm).

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**Table 1: Weather conditions during the year December 2011 to February 2013**

Growth Stages	Month	Met. Week	Temperature (°C)		Wind Speed (kmp h)	BSS (hrs)	Humidity (%)		Rainfall (mm)	Rainy Days (Nos.)
			Maxi.	Mini.			Morn	Even.		
<b>Germination</b>	Dec.,11	49-52	30.5	15.2	-	7.9	78.3	37.3	0.0	-
	Jan. 12	1-5	30.7	14.0	2.5	8.8	79.8	37.4	0.0	0.0
	<b>Average</b>	<b>-</b>	<b>30.6</b>	<b>14.6</b>	<b>2.5</b>	<b>8.3</b>	<b>79.0</b>	<b>37.3</b>	<b>0.0</b>	<b>0.0</b>
<b>Tillering</b>	Feb. 12	6-9	<b>30.6</b>	<b>14.6</b>	<b>2.5</b>	<b>8.3</b>	<b>79.0</b>	<b>37.3</b>	0.0	0.0
	Mar.12	10-13	36.8	18.1	2.8	8.4	71.5	24.5	0.0	0.0
	Apr-12	14-18	37.1	20.8	3.0	7.7	85.0	32.4	26.2	2.0
	<b>Average</b>	<b>--</b>	<b>34.9</b>	<b>17.8</b>	<b>2.8</b>	<b>8.1</b>	<b>78.5</b>	<b>31.4</b>	<b>26.2</b>	<b>2.0</b>
<b>Early Growth</b>	May.12	19-22	36.7	21.6	3.6	9.7	86.5	35.8	11.8	1.0
	June,12	23-26	31.0	21.1	3.3	4.7	93.8	67.5	110.7	8.0
	<b>Average</b>	<b>--</b>	<b>33.8</b>	<b>21.3</b>	<b>3.5</b>	<b>7.2</b>	<b>90.1</b>	<b>51.6</b>	<b>122.5</b>	<b>9.0</b>
<b>Grand Growth</b>	Jul-12	27-31	27.1	21.2	3.6	1.7	97.2	88.0	333.4	22.0
	Aug.12	32-35	27.5	20.8	2.4	2.4	98.0	84.0	146.2	13.0
	Sept.12	36-39	28.3	19.9	0.6	3.8	96.3	77.0	102.1	10.0
	<b>Average</b>	<b>--</b>	<b>27.6</b>	<b>20.6</b>	<b>2.2</b>	<b>2.6</b>	<b>97.2</b>	<b>83.0</b>	<b>581.7</b>	<b>45.0</b>
<b>Flowering &amp; maturity</b>	Oct.12	40-44	29.8	19.9	0.0	5.6	89.8	65.8	90.6	6.0
	Nov.12	45-48	30.6	18.1	0.0	6.6	75.8	42.8	22.9	2.0
	Dec.12	49-52	31.1	15.5	0.0	8.1	83.0	38.5	0.0	0.0
	Jan.13	01-05	31.8	14.8	-	7.3	83.4	32.4	0.0	0.0
	Feb.13	06-09	33.2	16.5	2.0	8.5	78.3	29.8	0.8	0.0
	<b>Average</b>		<b>31.3</b>	<b>16.9</b>	<b>0.5</b>	<b>7.2</b>	<b>82.0</b>	<b>41.8</b>	<b>114.3</b>	<b>8.0</b>
	<b>Total rainfall (mm)</b>								<b>843.9</b>	<b>64</b>
	<b>Average rainfall (mm)</b>								<b>1011.0</b>	<b>67</b>

\*Total

(iv)

Table 2 : Week wise weather data recorded for the year 2011-12-13.

MW No.	Period	Rain mm.	Rainy Day	Mean Temp °C		Wind Speed kmph	BSS hrs	Mean Relative humidity		Evap. mm.
				Max.	Min.			M.	E.	
<b>Dec 2011</b>										
49	03/12 – 09/12	00.0	-	31.1	16.3	Faulty	08.0	84	42	07.8
50	10/12 – 16/12	00.0	-	30.7	16.5	Faulty	08.2	79	44	06.4
51	17/12 – 23/11	00.0	-	29.3	13.8	Faulty	07.7	78	35	04.2
52	24/12 – 31/12	00.0	-	30.9	14.0	Faulty	07.6	72	28	04.0
<b>January 12</b>										
01.	01/01-07/01	00.0	0	32.8	17.8	2.3	7.5	88	39	3.8
02.	08/01-14/01	00.0	0	28.9	12.1	2.0	8.4	67	39	4.2
03.	15/01-21/01	00.0	0	30.7	11.1	2.8	10	80	37	3.7
04.	22/01-28/01	00.0	0	30.7	14.2	2.5	8.8	88	37	3.9
05.	29/01-04/02	00.0	0	30.5	14.9	2.7	9.1	76	35	4.3
<b>February 12</b>										
06.	05/02-11/02	00.0	0	32.7	14.7	1.9	9.3	86	40	5.1
07.	12/02-18/02	00.0	0	33.4	15.2	1.9	9.9	69	27	5.3
08.	19/02-25/02	00.0	0	35.1	17.7	2.3	9.6	70	23	6.1
09.	26/02-04/03	00.0	0	35.6	14.9	2.3	11.3	70	17	6.3
<b>March, 12</b>										
10.	05/03 – 11/03	00.0	0	34.9	14.3	2.5	9.4	74	31	6.6
11.	12/03 – 18/03	00.0	0	36.5	18.4	2.7	8.8	57	22	7.3
12.	19/03 – 25/03	00.0	0	38.4	19.3	3.2	8.2	71	23	6.6
13.	26/03 – 01/04	00.0	0	37.5	20.3	2.8	7.3	84	22	5.9
<b>April, 12</b>										
14.	02/04 – 08/04	14.8	1	37	20.1	2.8	7.8	89	39	5.7
15.	09/04 – 15/04	00.0	0	36.6	21.2	3.0	7.0	84	33	6.7
16.	16/04 – 22/04	00.0	0	37.6	22.0	3.1	6.8	82	31	7.4
17.	23/04 – 29/04	11.4	1	37.3	20.5	2.8	6.9	79	28	7.1
18.	30/04 – 06/05	00.0	0	37.2	20.1	3.5	9.8	91	31	6.8
<b>May, 12</b>										
19.	07/05 – 13/05	11.8	1	36.5	21.1	3.0	08.5	88	36	06.3
20.	14/05 – 20/05	00.0	0	37.9	21.4	2.9	10.2	84	28	06.4
21.	21/05 – 27/05	00.0	0	36.1	22.1	4.2	10.3	88	40	06.6
22.	28/05 – 03/06	00.0	0	36.1	21.8	4.2	09.9	86	39	05.2
<b>June 12</b>										
23.	04/06 – 10/06	14.9	2	32.2	21.6	2.8	06.9	94	69	04.6
24.	11/06 – 17/06	05.7	1	31.5	21.4	3.7	05.6	92	60	06.1
25.	18/06 – 24/06	26.1	1	30.4	20.9	4.2	04.2	93	60	04.1
26.	25/06 – 01/07	64.0	4	29.8	20.3	2.6	02.2	96	81	02.8
<b>July 12</b>										
27.	02/07 – 08/07	036.3	3	27.5	20.4	3.3	01.3	95	89	02.0

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28.	09/07 - 15/07	008.4	1	28.6	21.0	2.4	03.4	96	77	02.8
29.	16/07 – 22/07	077.1	5	26.6	21.9	4.6	00.7	99	95	02.0
30.	23/07 – 29/07	091.8	7	26.6	21.5	3.7	01.3	97	88	01.5
31.	30/07 – 05/08	119.8	6	26.3	21.0	4.0	01.7	99	91	01.8
	<b>August 2012</b>									
32.	06/08 – 12/08	076.1	7	26.5	21.3	3.1	00.8	99	94	01.9
33.	13/08 – 19/08	013.1	2	28.0	20.5	2.4	04.5	98	83	03.6
34.	20/08 – 26/08	003.6	0	29.2	20.7	1.9	03.1	96	77	02.6
35.	27/08 – 02/09	053.4	4	26.1	20.7	2.2	01.3	99	82	01.8
	<b>Sept 2012</b>									
36.	03/09 - 09/09	075.6	6	25.8	20.6	2.3	00.9	98	94	01.5
37.	10/09 - 16/09	017.9	3	28.1	20.4	0.0	04.5	98	75	03.1
38.	17/09 - 23/09	002.8	0	30.3	19.1	0.0	04.4	94	66	03.3
39.	24/09- 30/09	005.8	1	28.9	19.5	0.0	05.2	95	73	04.8
	<b>Oct 2012</b>									
40.	01/10 - 07/10	068.6	4	26.3	20.7	0.0	02.1	98	87	02.7
41.	08/10 – 14/10	017.6	1	31.5	20.6	0.0	05.0	96	70	03.5
42.	15/10 – 21/10	000.0	0	30.7	18.1	0.0	08.7	78	49	04.8
43.	22/10 – 28/10	004.4	1	30.6	20.0	0.0	06.6	87	57	03.6
	<b>Nov 2012</b>									
44.	29/10 – 04/11	022.9	2	29.3	18.9	0.0	03.4	73	46	03.7
45.	05/11 – 11/11	000.0	0	31.8	20.4	0.0	07.6	90	48	03.3
46.	12/11 – 18/11	000.0	0	30.2	16.3	0.0	08.6	69	34	03.8
47.	19/11 – 25/11	000.0	0	31.0	16.4	0.0	06.9	66	43	03.9
48.	26/11 – 2/12	000.0	0	30.8	18.4	0.0	06.6	81	43	03.4
	<b>Dec 2012</b>									
49.	3/12 – 9/12	000.0	0	31.3	18.5	0.0	07.5	82	46	03.4
50.	10/12 – 16/12	000.0	0	31.8	14.8	0.0	08.9	93	35	03.6
51.	17/12- 23/12	000.0	0	30.7	15.2	0.0	08.5	80	35	04.0
52.	24/12-31/12	000.0	0	30.5	13.5	0.0	07.6	77	38	04.0
	<b>January 13</b>									
01.	01/01-07/01	00.0	0	31.6	15.9	NA	6.5	88	41	4.5
02.	08/01-14/01	00.0	0	31.0	14.5	NA	7.2	79	31	4.2
03.	15/01-21/01	00.0	0	32.0	13.7	NA	8.5	84	29	4.3
4.	22/01-28/01	00.0	0	32.4	14.5	NA	7.2	86	29	4.1
05.	29/01-04/02	00.0	0	31.9	15.3	NA	7.3	80	32	4.2
	<b>February 13</b>									
06.	05/02-11/02	00.0	0	32.5	15.2	1.4	7.7	88	34	4.2
07.	12/02-18/02	00.8	0	32.1	17.4	2.3	8.0	78	34	3.9
08.	19/02-25/02	00.0	0	33.7	15.8	1.4	9.3	78	27	4.2
09.	26/02-04/03	00.0	0	34.3	17.6	2.7	9.1	69	24	5.6

NB : - \* Data on wind speed were not recorded (41-52 MW) due to instrumental error.

1  
**SUGARCANE PATHOLOGY**

**PART – I: ON GOING RESEARCH PROGRAMME.**

**1) Title: Evaluation of pre-zonal/zonal varieties/I.V.T./genotypes for resistance to smut.**

1. Title of the project : Plant Protection.
2. Name of the Scientists : Prof. D.M. Veer.  
Miss.K.B.Patil.
3. Name of experiment : Evaluation of pre-zonal/zonal varieties/I.V.T./  
genotypes for resistance to smut.
4. Object : To gather information on relative  
resistance to smut of the entries included under  
crop improvement programme.
5. Location : Regional Sugarcane and Jaggery  
Research Station, Kolhapur.
6. Experimental Details :
  - i) Year of start : 1994-95- long term experiment
  - ii) Genotypes and varieties : Total genotypes- **32**  
Check varieties - **5**
  - iii) Inoculum : *Ustilago scitaminea* teliospores  
collected from commercially  
cultivated susceptible varieties  
Co 740 and Co 7527 for artificial inoculation.
  - iv) Inoculation : The method of inoculation  
consists of deeping of setts for  
30 minutes in spore suspension  
of over 90% viability and with  
spore load of one million spores  
per milliliter ( $10^6$ ).
  - v) Plot size and  
planting : Plot size-3 meter row length  
(3x1m), Planting - Two eye  
budded 15 setts of each variety  
were planted after inoculation.
  - vi) Observations : Number of smut infected clumps of each  
genotype was recorded periodically.
  - vii) Evaluation : Evaluation is based on percentage  
clumps infected. The following grading criteria  
was used.

0.0 per cent	:	Resistant ( R )
0.1 - 10 per cent	:	Moderately resistant (MR)
10.1- 20 percent	:	Moderately susceptible (MS)
20.1- 30 per cent	:	Susceptible (S)
Above 30 per cent	:	Highly susceptible (HS)



**Table 1: Incidence of smut on sugarcane genotypes / varieties**

Sr. No	Name of genotype	Smut incidence (%)	Reaction
<b>(I) IVT Early</b>			
1	Co 09002	3.54	MR
2	Co 09003	0.00	R
3	Co 09004	6.43	MR
4	Co 09005	0.00	R
5	Co 09006	0.00	R
6	Co 09007	1.53	MR
7	CoN 09071	4.63	MR
8	CoN 09072	2.87	MR
<b>(II) AVT Early I Plant</b>			
1	Co 08001	5.84	MR
2	VSI 08121	0.00	R
<b>(III) AVT Early II Plant</b>			
1	Co 07012	13.53	MS
2	Co 07015	0.00	R
3	CoN 07071	6.23	MR
4	PI 07131	4.33	MR
<b>(IV) IVT Midlate</b>			
Sr.No	Name of genotype	Smut incidence (%)	Reaction
1	Co 09009	2.93	MR
2	Co 09010	0.00	R
3	Co 09012	5.13	MR
4	Co 09013	1.47	MR
5	Co 09014	0.00	R
6	Co 02040	0.00	R
7	CoN 09073	0.00	R
8	CoN 09074	2.73	MR
9	CoSnk05102	1.17	MR
10	CoVSI 09121	3.83	MR
<b>(V) AVT Midlate I Plant</b>			
Sr.No	Name of genotype	Smut incidence (%)	Reaction
1	Co 08008	0.00	R
2	Co 08009	0.00	R
3	Co 08016	5.87	MR
4	CoSnk 08101	0.00	R
<b>(VI) AVT Midlate II Plant</b>			
Sr.No	Name of genotype	Smut incidence (%)	Reaction
1	Co 07006	0.00	R
2	Co 07007	2.57	MR
3	Co 07008	1.23	MR
4	Co 07009	0.00	R
5	Co 07010	7.63	MR
6	CoSnk 07103	0.00	R

Checks			
Sr.No	Name of genotype	Smut incidence (%)	Reaction
<b>EARLY GROUP</b>			
1	Co 85004	14.47	MS
2	Co 94008	11.84	MS
3	CoC 671	16.93	MS
<b>MIDLATE GROUP</b>			
1	Co 86032	13.83	MS
2	Co 99004	0.00	R

**Results:**

- 1) **IVT Early:** The data of smut incidence under artificial inoculation condition is presented in Table 1. Among the tested sugarcane genotypes; Co 09003, Co 09005 and Co 09006 were found resistant to smut disease.
- 2) **AVT Early (I Plant):** Only two sugarcane genotypes *viz.*, Co 08001 and CoVSI 8121 were tested for smut reaction and they were shown moderately resistant and resistant reaction respectively against smut disease under artificial inoculation condition.
- 3) **AVT Early (II Plant):** Among tested four genotypes Co 07015 showed resistant reaction against smut disease while two genotypes (CoN 07071 and PI 07031) found moderately resistant. Only one genotype Co07012 was found moderately susceptible to smut.
- 4) **IVT Midlate:** Ten sugarcane genotypes were screened for smut disease reaction under artificial inoculation condition. Among them four sugarcane genotypes were found resistant to smut disease and rest of sugarcane genotype moderately resistant smut disease.
- 5) **AVT Midlate I plant:** In this trial four sugarcane genotypes were tested for smut disease reaction. These genotypes *viz.*, Co 08008, Co 08009 and CoSnk 08101 were showed resistant reaction smut under artificial inoculation condition. The sugarcane genotype Co 08016 was found moderately resistant to smut disease.
- 6) **AVT Midlate II plant:** In this trial six sugarcane genotypes were screened for smut disease reaction under artificial inoculation. Among them Co 07006, Co 07009 and CoSnk 07103 were found resistant smut disease whereas Co07007, Co 07008 and Co 07010 were found moderately resistant to smut disease.
- 7) **Checks: Early-** Three sugarcane varieties selected as standard checks *viz.*, Co 85004, Co 94008 and CoC 671 for Peninsular zone were tested for against smut disease. These standard checks found moderately susceptible to smut disease.  
**Midlate-** Two checks *viz.*, Co 86032 and Co 99004 were found moderately susceptible and resistant to smut disease respectively to smut disease under artificial inoculation condition.

**2) Title: Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties.**

1. Title of the project : Plant Protection.
2. Name of the Scientists : Prof. D.M. Veer.  
Miss. K. B. Patil.
3. Name of experiment : Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties.
4. Object : To gather information of diseases of sugarcane varieties grown on commercially basis.

**5. Preamble :**

Most of the cultivators are bringing the infected seed material of recommended or not recommended sugarcane varieties/genotypes in the region from adjoining states *viz.* Karnataka and Gujarat. Hence, there are chances to develop new flora of insects pest and diseases in the region and sometime it is too difficult to control their spread up in the region. It is therefore, essential to undertake the survey of sugarcane diseases. The information on occurrence and their intensity on different sugarcane varieties/genotypes to be required for preparation of disease status at national level. Therefore, the survey work was undertaken in the region and recorded the natural occurrence of diseases on commercially grown sugarcane varieties.

**6. Results :**

In Kolhapur region, the recommended sugarcane varieties belonging to early group i.e., CoC 671, Co 92005 and Co 8014 are almost under *suru* cultivation. Whereas midlate group sugarcane varieties Co 86032 and CoM 0265 under preseasonal and Ad sali season. However the area of sugarcane varieties Co 86032 and CoM 0265 are more as compare to other sugarcane varieties respectively. Co 92005 is cultivated in Submontane zone and it is suitable variety for paddy base sugarcane system. This variety introduced in some part of Konkan (Vaibhawadi Tahsil). At present this variety playing vital role in achieving high recovery of some sugar factories located in Submontane zone.

The survey of sugarcane diseases was carried out before onset of south-west monsoon and after over monsoon in the region. Among the cultivated sugarcane varieties, none of the variety is not found disease free . The incidence of seed borne disease *viz.*, Grassy shoot disease is increased due to non use of healthy seed material. It is, noticed that the smut disease is not much observed in the zone except Co 7527 (Maximum 5%).

Among the foliar diseases, rust and ring spot, fungal diseases are predominant in the region because of weather condition. The intensity of these diseases were noticed in the range

of 20-80 % ( Rust) and 5-10 % (Ring Spot). The Pokkah boeng disease was noticed in all sugarcane varieties after receiving Pre-monsoon shower in May. But, it is, disappeared after starting of South West Monsoon.

Since, last year, (2011-12 –crop span), the brown spot disease was noticed on CoM 0265 Sugarcane variety with high intensity upto 80%. This is foliar disease which is caused by *Cercospora longipes*. It sprayed through air in Monsoon season when there is drizzling rains with more R.H.(> 80%). The another detrimental disease is Yellow Leaf Disease which is caused by virus. The sugarcane variety Co 86032 is highly suscetible to YLD. The intensity of YLD is more on Co 86032 after attaining the age of eight months. Another viral disease mosaic was noticed in all Sugarcane varieties. Hence the following plant protection measures were suggested for control of fungal, phytoplasmal and viral diseases.

1. To use disease free material.
2. To follow thermotherapy for control of seed borne diseases.
3. To undertake seed production by adopting three tier system.
4. To plant disease resistance varieties.
5. Seed treatment with Carbendanzim (0.1 %).
6. Field sanitation.
7. To apply proper dose of Nitrogen.
8. Drain out excess water.
9. To follow Quarantine Law within the States regarding transportation of seed material.
10. To bring awareness among the farmers for control of diseases.
11. To develop disease resistance varieties through Genetic Engineering Technology.

**Table-2: The survey of sugarcane diseases.**

Sr. No.	Name of Tahsil	Name of Variety	Smut (%)	GSD (%)	Brown spot (%)	Rust (%)	Ring Spot (%)	Eye Spot (%)	Pokha Boeng (%)	Mosaic (%)	Yellow Leaf Disease (%)
1	Karveer	Co 86032	-	2	-	-	5	-	1	10	15
		CoM 0265	-	5	70-80	-	5	-	2	5	-
		Co 92005	-	1	-	20	5	-	2	5	-
		CoC 671	-	3	-	40-50	10	-	2	5	1
		Co 7527	5	2	-	60-70	10	-	2	10	-
	Hatalangale	Co 86032	-	2	-	-	5	-	2	5	10
		CoM 0265	-	5	80	-	2	-	2	10	-
		CoC 671	-	3	-	60	5	-	5	10	2
3	Kagal	Co 86032	-	2	-	-	5	-	2	10	10
		CoM 0265	-	3	70-80	-	5	-	2	10	-
		Co 92005	-	2	2	50	5	-	3	5	5
		CoC 671	-	2	-	60	10	-	1	10	5
		Co 7527	2	3	5	60	5	-	3	10	-
4	Ajara	Co 86032	-	3	-	-	5	-	-	10	10
		CoM 0265	-	4	80	-	5	-	2	10	5
		Co 92005	-	3.5	-	50	5	-	1.5	10	2
		CoC 671	-	3.5	-	60	5	-	1.5	10	10
5	Shirol	Co 86032	-	2	-	-	-	-	2	10	15
		CoM 0265	-	4	80	-	-	-	1.5	10	-
6	Panhala	Co 86032	-	2	-	-	5	-	1	10	10
		CoM 0265	-	2	80	-	5	-	1	10	2
		Co 92005	-	5	-	50	5	-	1	10	10
		CoC 671	-	5	-	70	10	-	2	15	10

7	Radhanagari	Co 86032	-	2	-	-	5	-	1	10	10
		CoM 0265	-	2	80	-	5	-	1	5	2
		Co 92005	-	3	-	60	5	-	1	10	5
		CoC 671	-	4	-	80	10	-	2	10	10
8	Gadinglaj	Co 86032	-	2	-	-	5	-	2	10	10
		CoM 0265	-	2.5	70-80	-	-	-	2	5	-
		Co 92005	-	5	-	50	5	-	2	5	10
		CoC 671	-	2.5	-	60	5	-	2	10	10
		Co 7527	3	2.5	-	60	10	-	1.5	10	10
9	Gagan Bawada	Co 86032	-	2	-	-	10	-	1	10	10
		CoM 0265	-	2	80	-	5	-	1	10	5
		Co 92005	-	1.5	-	50	5	-	2	10	5
		CoC 671	-	2	-	60	5	-	1.5	10	5
10	Chandgad	Co 86032	-	2.5	-	-	5	-	3	10	10
		CoM 0265	-	2	80	-	5	-	2	10	5
		Co 92005	-	2.5	-	60	5	-	2	10	5
		CoC 671	-	3	-	60	5	-	2	10	5
11	Shauwadi	Co 86032	-	2	-	-	5	-	2	10	10
		CoM 0265	-	2	80	-	5	-	1	10	5
		Co 92005	-	2	-	60	5	-	1	10	5
		CoC 671	-	4	-	80	5	-	2	10	10
12	Bhudargad	Co 86032	-	3	-	-	10	-	2	10	10
		CoM 0265	-	3	80	-	5	-	1	10	5
		Co 92005	-	2	-	5	5	-	2	10	5

### Title 3.PP 31: Screening, epidemiology and management of pokkah boeng in sugarcane

**Objectives:** To study the development of pokkah boeng disease in relation to weather parameters and its management in sugarcane crop.

**Year of start:** 2011-2012

**Observations to be recorded:**

- i. Screening the desirable varieties for the incidence of pokkah boeng.
- ii. Correlation of climatic factors in relation to disease development and management of pokkah boeng under field conditions if the disease reaches acute phase.

(i) **Screening:**

**Symptoms to be observed**

**Mild** - Green plants with pokkah boeng (curling/ twisting of spindle leaves, tearing of leaves, whitish/chlorotic streaks on the leaves) at varying intensities.

**Moderate** - Yellowing of 3<sup>rd</sup>/ 4<sup>th</sup> leaf followed by complete yellowing of foliage and expression of top rot symptom

**Severe** - Yellowing of leaves + Discolouration (Light coloured) of stalks + Wilting symptom in opened stalks

(ii) **Epidemiology**

Record temperature, relative humidity and rainfall from May to September and establish correlation with disease incidence

### INTRODUCTION :

Pokkah Boeng is a Javanease term denoting a malformed or distorted top and it was originally described in 1896 by Wakker and went in Java. Bolle (1927) was the first to demonstrate by repeated isolation and isolation studies, that the disease is caused by Fungus, *Fusarium moniliforme* Sheldon. The occurrence of Pokkah Boeng disease has been recorded in almost countries where Sugarcane is growing commercially.

The disease is common during monsoon months in the field. Under normal studies it may not cause significant field loss but it has the potential to arrest the crop growth temporarily. The disease occurs throughout India and severe forms of the disease are recorded in Maharashtra, Gujarat, Karnataka and Kerala.

The disease manifest in two phases.viz. Pokkah Boeng and Top rot. The most common symptom is malformed on twisted top. Symptoms develop during rainy periods which coincide with grand growth period. In Maharashtra, the incidence of P.B. is recorded in all planting seasons i.e. Adsali, Preseasonal and Suru.

The earliest symptom of Pokkah Boeng is chlorotic condition towards the base of young leaves and occasionally on other parts of the blades.

Frequently the malformed or distortion of the young leaves is accompanied by pronounced wrinkling, twisting and shortening of the leaves and distoration of the stalk.

### SYMPTOMS

Initially, young leaves are chlorotic at their base and patchy elsewhere on the blade. Chlorosis is most oblivious on the lower surface of the leaf or twisted in laminar regions. Affected leaves tend to

be narrow at the base. Development of further symptoms is dependent on the susceptibility of the variety and environmental conditions conducive to the pathogen. Young leaves may become infected in the spindle, resulting in pronounced wrinkling, twisting and shortening of leaves. Sometimes leaves are shortened to few inches without lamina having malformed midrib or growth of the leaves ceased to few inches without malformation giving d-topped spindle. As the leaves mature, irregular reddish stripes and specks develop within the chlorotic areas. Infection in the spindle may reach growing point and continue into the stalk. Sometime growing point is killed leading to development of top rot. Due to death of spindle, sprouting of the lateral buds occurs. Most of the pokkah boeng infected canes generally recover from the symptoms but into top rot recovery is not there. Upon recovery we notice the normal whorl with remnants of twisted leaf portions of affected leaves still around the spindle.

### EPIDEMIOLOGY

The disease is favored by warm, moist growing conditions. Symptoms development begins early in the monsoon season, which normally coincides with rapid and vigorous growth of cane. The three to seven months sugarcane crops are most susceptible to the disease. Conidia are air borne and are deposited on the plants, then washed by rains into infection site.

### TRANSMISSION

The transmission of the disease is largely by the movement of the spores from one locality to another by air currents. Conidia which enter the spindle during dry weather are later carried down by rain to the susceptible region where they germinate. The mycelium passes through the still soft cuticle of these spindle leaves to the inner tissues. The incubation time is about one month.

### ECONOMIC IMPORTANCE

The pokkah boeng disease was noticed in Java country on large scale. Cane three to seven months old and growing vigorously is more susceptible to infection than older cane and infection is found in many late tillers suppressed by the older stalks. Varietal susceptibility to pakkah boeng has in some instance be increased by late applications of ammonium sulphate producing a soft succulent growth, or by heavy watering following dry weather.

**Table 4: Occurrence of Pokkah Boeng disease in varietal trials under natural conditions.**

Varieties	Per cent infected plants				Disease Reaction
	Mild	Moderate	Severe	Total Incidence	
<b>Early Group</b>					
<b>(I) IVT Early</b>					
Co 09002	---	--	--	0.00	R
Co 09003	--	--	--	0.00	R
Co 09004	---	10.00	--	10.00	MS
Co 09005	--	-	-	0.00	R
Co 09006	3.00	-	-	3.00	R
Co 09007	---	-	-	0.00	R
CoN 09071	2.00	-	-	2.00	R
CoN 09072	---	-	-	0.00	R



<b>(II) AVT Early I Plant</b>					
Co 08001	-	-	-	0.00	R
VSI 08121	-	-	15.00	15.00	S
<b>(III) AVT Early II Plant</b>					
Co 07012	--	--	--	0.00	R
Co 07015	--	8.00	--	8.00	MS
CoN 07071	5.00	--	--	5.00	R
PI 07131	--	--	--	0.00	R
<b>(IV) IVT Midlate</b>					
Co 09009	--	--	--	0.00	R
Co 09010	--	10.00	--	10.00	MS
Co 09012	--	--	--	0.00	R
Co 09013,	--	--	--	0.00	R
Co 09014	3.00	--	--	3.00	R
Co 02040	--	--	25.00	25.00	HS
CoN 09073	--	--	30.00	30.00	HS
CoN 09074	---	--	--	0.00	R
CoSnk05102	--	10.00	--	10.00	MS
CoVSI 09121	--	--	20.00	20.00	S
<b>(V) AVT Midlate I Plant</b>					
Co 08008	3.00	--	--	3.00	R
Co 08009	--	10.00	--	10.00	MS
Co 08016	--	--	--	0.00	R
CoSnk 08101	2.00	--	--	2.00	R
<b>(VI) AVT Midlate II Plant</b>					
Co 07006	--	--	--	0.00	R
Co 07007	--	10.00	--	10	MS
Co 07008	---	--	--	0.00	R
Co 07009	---	--	--	0.00	R
Co 07010	--	--	--	0.00	R
CoSnk 07103	--	--	15.00	15.00	S
<b>Checks</b>					
Co 85004	--	--	--	0.00	R
Co 94008	--	--	10.00	10.00	S
CoC 671	--	--	12.00	12.00	MS
Co 86032	--	--	--	0.00	R
Co 99004	--	--	15.00	15.00	S

**Disease Reaction:**

0-5% - Resistant; >5-10% - Mod. Susceptible; >10-20% - Susceptible; > 20% - Highly Susceptible

**Result:**

The data pertaining to natural incidence of Pokkah boeng disease on different sugarcane genotypes is presented in Table 4. In early group of sugarcane genotype, the incidence of Pokkah boeng was noticed on Co 09004, VSI 08121 and Co 07015. Sugarcane genotype CoVSI 08121 was found susceptible to Pokkah boeng and remaining were found resistant.

In midlate group number of sugarcane genotypes shown susceptible and moderately susceptible reaction to Pokkah boeng. However, Co 02040 and CoN 09073 genotypes were found highly susceptible to Pokkah boeng disease under natural condition. In check varieties CoC 671 and Co 99004 were found susceptible.

#### 4) Title 4: Management of rust of sugarcane.

**Objective** : To find out effective method of rust management through chemicals.

**Year of Start** : 2012-13

**Treatment** :

**I. Variety** : Rust susceptible variety of the area

#### **II. Fungicides**

T.1	- Chlorothalonil	-	0.25 %
T.2	- Propineb	-	0.20 %
T.3	- Triadimefon	-	0.10 %
T.4	- Mancozeb	-	0.30 %
T.5	- Control (Untreated)		

**III. Time of application of fungicides:** To be applied just after appearance of rust pustules followed by two sprays at 15 days interval.

**Plot size** : 6 x 7 sq. m

**Design** : RBD

**Replications** : Three

**Observations** :

1. Germination %
2. Disease severity (% leaf area covered with rust pustules based on observations of 10 leaves per clump; total no. of clumps to be observed at least 10 )
3. Cane yield per plot and per hectare
4. Brix, Pol %, Purity and CCS %
5. Cost-benefit ratio

**Note:** The experiment is vitiated.

**1) Title : To study the effect of fungicides for control of eyespot, ring spot and brown spot.**

**Objective** -To find out effective fungicides against foliar diseases.

**Year of start:** 2013-14

**Name of scientist** -Prof.D.M.Veer.Plant Pathologist,  
Miss.K.B.Patil, Jr.Res.Asstt.

**Treatments:**

**A) Main treatment-**

- |                       |                        |
|-----------------------|------------------------|
| 1.Carbendazim (0.1%). | 2.Diathenim 45 (0.2%). |
| 3.Propineb (0.1%).    | 4.Chlorothalonil.      |
| 5.Triadimefon         | 6. Control             |

**B) Varieties**

- |            |            |             |
|------------|------------|-------------|
| 1. CoM 265 | 2. CoC 671 | 3. Co 92005 |
|------------|------------|-------------|

Design	- Factorial block design
Replication	- Four
Plot Size	- 6M x 4Row

**Note: The experiment is vitiated.**

**2) Title:** Evaluation of advanced sugarcane genotypes for diseases under natural incidence.

1. Title of the project : Plant Protection.
2. Name of the Scientists: Prof. D.M. Veer. Plant Pathologist,  
Miss. K. B. Patil. Jr.Res.Asstt.
3. Name of experiment : Evaluation of Advance sugarcane genotypes in various varietal trials for identifying disease free genotypes under natural condition.
4. Objects : i) To record major & minor diseases of sugarcane  
ii) To prepare disease status of each genotype.
5. Experimental Details: In AICRP on sugarcane various varietals trials belonging to early and midlate maturity group were conducted during 2012-2013.

**Result:**

The sugarcane genotypes belonging to early and midlate maturity group were tested in different varietal trials i.e. IVT, AVT-I and AVT-II under crop improvement programme.

The total rainfall was received during monsoon (2012) which is deficit as compare to last year and flood situation is not occurred. However, in the region, there was cloudy weather with high relative humidity (> 80%). hence, the foliar diseases were on most of the genotypes. Among them brown spot disease intensity was noticed more on (CoM 0265, Co05002,Co 05002 and CoM 0254).

The rust and ring spot diseases and their intensity was observed more on CoC 671,Co94012 and Co92005 because congenial weather condition raised for longer period during monsoon season. The pokkah boeng disease was also noticed during May 2012 (Premonsoon period).

The viral diseases viz., Mosaic and Yellow Leaf Disease were noticed on most of the genotype with high intensity.YLD disease is very detrimental or threatening to sugarcane crop. Hence, need to take proper care for it's control.

**Table 3: Occurrence of diseases in varietal trials under natural conditions.**

Sr.No	Name of genotype	Disease Noticed
<b>(I) IVT Early</b>		
1	Co 09002	Ring Spot
2	Co 09003	Rust
3	Co 09004	Ring Spot
4	Co 09005	-
5	Co 09006	Ring Spot
	Co 09007	Rust
	CoN 09071	Ring Spot and Rust
	CoN 09072	Ring Spot and Rust
<b>(II) AVT Early I Plant</b>		
1	Co 08001	Rust, Ring Spot , Pokkah boeng
2	VSI 08121	
<b>(III) AVT Early II Plant</b>		
1	Co 07012	Rust
2	Co 07015	Yellow Leaf Disease
3	CoN 07071	
4	PI 07131	
<b>(IV) IVT Midlate</b>		
1	Co 09009	Rust
2	Co 09010	Rust
3	Co 09012	Rust
4	Co 09013,	Rust
5	Co 09014	Rust
6	Co 02040	Rust, Pokkah boeng
7	CoN 09073	Rust , Pokkah boeng
8	CoN 09074	Rust, Ring Spot
9	CoSnk 05102	Pokkah boeng , Rust, Yellow Leaf Disease
10	CoVSI 09121	Rust, Pokkah boeng, Ring Spot
<b>(V) AVT Midlate I Plant</b>		
Sr.No	Name of genotype	
1	Co 08008	--
2	Co 08009	Rust
3	Co 08016	Rust
4	CoSnk 08101	Brown Spot
<b>(VI) AVT Midlate II Plant</b>		
Sr.No	Name of genotype	
1	Co 07006	Rust, Ring Spot
2	Co 07007	Ring Spot, Pokkah boeng, Yellow Leaf Disease
3	Co 07008	Rust, Yellow Leaf Disease, Ring Spot
4	Co 07009	Brown Spot, Yellow Leaf Disease
5	Co 07010	Rust, Brown Spot
6	CoSnk 07103	Rust
<b>Checks</b>		
Sr.No	Name of genotype	
1	Co 85004	Ring Spot, Mosaic
2	Co 94008	Rust, Ring Spot, Pokkah boeng
3	CoC 671	Rust, Ring Spot, Pokkah boeng
4	Co 86032	Mosaic, Yellow Leaf Disease
5	Co 99004	Pokkah boeng, Mosaic, Rust

**OUTBREAK OF BROWN SPOT**

Causal organism – *Cercospora longipes* E.J.Butler.

Brown spot causes reddish brown to dark brown spot on sugarcane leaves. The lesions vary in the size from pin point to about 3X15 mm. The spots are oval in shape, often surrounded by a yellow halo and are equally visible on both sides of the leaf. Leaf spots are present on the older leaves and are generally well distributed over the entire surface. The percentage leaf area depends on the resistance of variety. In severe cases, the spots cover extensive area of the leaf surface; they coalesce and may be present on the younger leaves. On some varieties older leaves turn yellow and die prematurely. This produces the 'fired' appearance of affected fields, late in the season.

- Severe incidence noticed on recommended varieties - CoM 0265, CoM 0254 and Co 05002.
- Varieties free from diseases - Co 86032, Co 92005, Co 8014, CoC 671, Co 94012 and Co 7527.
- Period of occurrence of disease - July 2011 to January 2012.

**MANAGEMENT**

- To plant highly resistant varieties in high rainfall area.
- To drain the field after over of monsoon.
- To spray Mancozeb (0.2%) or Carbendanzim (0.01%)fungicides.



### 3.List of Publications – 2012-13

#### A) Publications:

##### i) Research Articles:

Sr. No.	Title of research paper	Name of author (s)	Name of journal	Year, Vol. No. and page No of the Journals
2	Evaluation of promising clones (midlate group) of sugarcane for productivity, growth and quality parameters in Southern Maharashtra	<b>K.B. Patil, D.M. Veer</b> and V.Y. Kankal	71 <sup>st</sup> Annual Convention of STAI during 24 to 26 September 2012 organised by The Sugar Technologists' Association of India, New Delhi – 110 020.	Pp:203-207
1	Evaluation of promising sugarcane genotypes for cane yield, growth and quality parameters under <i>suru</i> season in southern Maharashtra	<b>K.B. Patil, V.Y. Kankal, D.M. Veer, B.G. Gaikawad , M.M. Suryavanshi</b> and S. M. More	59 <sup>th</sup> Annual Convention organized by the Deccan Sugar Technologists Association, (INDIA) Pune	2012 ,pp: A22- A25
2	Promising Sugarcane genotypes for quality jaggery	B.G. Gaikawad, G.S. Nevkar, U.S.Kudtarkar, <b>K.B. Patil, D.M. Veer,</b> and M.M. Suryavanshi	59 <sup>th</sup> Annual Convention organized by the Deccan Sugar Technologists Association, (INDIA) Pune	2012 ,pp: A26- A31
3	Effect of combined use of organic and chemical fertilizers on sugarcane productivity and jaggery quality in Southern Maharashtra	<b>K.B. Patil, D.M. Veer,</b> B.S.Kadam, G. S. Nevkar, U.S.Kudtarkar, B. G. Gaikwad and M. M. Suryavanshi	Proceedings International symposium on New Paradigms in sugarcane research 15 <sup>th</sup> to 18 <sup>th</sup> Oct. 2012 organized by "Society for Sugarcane Research and Development, Coimbatore and Sugarcane Breeding Institute, (ICAR) Coimbatore	2012, Pp: 88-89

4	Effect of weed management practices on cane yield and weed intensity of ratoon sugarcane (Co 86032)	M. M. Suryavanshi, <b>D.M. Veer, K. B. Patil,</b> B.G. Gaikawad, and U. S. Kudtarkar	59 <sup>th</sup> Annual Convention organized by the Deccan Sugar Technologists Association, (INDIA) Pune	2012 , pp: A218-A225
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**ii) Technical paper:**

Sr. No.	Title of research paper	Name of author (s)	Name of journal	Year, Vol. No. and page No of the Journals
1	Effect of combined use of organic and chemical fertilizers on sugarcane productivity and jaggery quality in Southern maharashtra	<b>K.B. Patil, D.M. Veer,</b> B.S.Kadam, G. S. Nevkar, U.S.Kudtarkar, B. G. Gaikwad and M. M. Suryavanshi	Proceedings International symposium on New Paradigms in sugarcane research 15 <sup>th</sup> to 18 <sup>th</sup> Oct. 2012 organized by "Society for Sugarcane Research and Development, Coimbatore and Sugarcane Breeding Institute, (ICAR) Coimbatore	Pp: 88-89

**iii) Publication of Marathi articles :**

Sr. No.	Title	Name of author (s)	Name of journal	Year, Vol. No. and page No of the Journals
1	Use of fertilizers as per soil testing and yield targeting equations for sugarcane	<b>K.B. Patil,</b> V. Y. Kankal, Dr. B. G. Gaikawad	Agri-Magazine "Purva Krishidoot", Nashik	January 2013, Vol. 4 (1),pp:95-97
2	Green manuring for sugarcane	<b>K.B. Patil,</b> Shri. U.S. Kudtrkar, M.M. Suryavanshi, <b>Prof. D. M. Veer</b>	Agri-Magazine "Purva Krishidoot", Nashik	January 2013, Vol. 4 (1),pp:153-155



**TECHNICAL PROGRAMME**

**2013-2014**

Long term	
	1: Evaluation of zonal varieties for resistance to smut.
	2: Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties.
	3: Screening, epidemiology and management of pokkah boeng in sugarcane.
Medium term	
	1. Management of rust of sugarcane.
	2. : Methodology for screening sugarcane genotypes for resistance to brown rust ( <i>Puccinia melanocephala</i> ).