

**VASANTDADA SUGAR INSTITUTE,
PUNE, MAHARASHTRA**

**Annual report of AICRP (S) of Plant Pathology discipline for the year
2015-16**

Project No	: AICRP- PP17-B
Title of the experiment	: Evaluation of zonal varieties of sugarcane for resistance to smut disease under artificial disease condition.
Objectives	: To gather information on the relative resistance to smut of the entries in zonal varietal trials of the peninsular zone.
Year of commencement	: 1994-95
Year of report	: 2015-16
Location of the experiment	: VSI, Pune
Date of planting	: 17.01.2015
Date of Harvesting	: 06.02.2016
Type of soil	: Medium black
Plot No	: Vasantdada R & D Farm, VSI, Pune
No. of varieties	: 32 genotypes/ varieties (Including checks: Co740 & Co7219)
No. of replications	: 2
Design of the experiment	: Rod row trial
Inoculum	: <i>Sporisorium scitaminea</i> teliospores collected from commercially cultivated varieties of sugarcane in Maharashtra, which served as source of inoculum.
Method of inoculation	: The method of inoculation consists of dipping of 2 eye-budded setts for 30 to 45 minutes in a smut spore suspension of over 90 % viability and with the spore load of 1 million spores per milliliter.
Plot Size	: Two rows of 5 meter length. Spacing between 2 rows: 120 cm.
Observations	: I) Number of healthy and smut affected stools per row were recorded for disease incidence & reaction II) Smut incidence was recorded at fortnightly intervals up to the harvest

Table: 1. Evaluation of sugarcane genotypes under ZVT's for smut resistance at VSI

Sr. No	Zonal Varietal Trial	Disease reaction with % disease incidence				
		Resistant (R) (0% DI) (15 genotypes)	Moderately Resistant (MR), (0.1% to 10.00% DI)	Moderately susceptible (10.1% to 20.00% DI) (10 genotypes)	Susceptible (20.01 to 30.00 DI) (5 genotypes)	Highly Susceptible (DI More than 30 %) (2 genotypes)
1	Initial Varietal Trial – early	Co11017, Co11018, CoN11071, CoN11072, CoT11366	-	Co11001 (20.00%), Co11004 (16.66%), CoM11082 (20.0%), CoM11084 12.50%), PII1131 (12.50%)	Co11016 (22.22%)	CoM11081 (33.33%), CoM11083 (50.00%)
2	Advanced Varietal Trial – early	CoN09072	-	-	Co09004 (25.00%) Co09007 (28.57%)	-
3	Initial Varietal Trial – Midlate	Co11021, Co11022, Co11023, Co11024, CoM11085, CoM11086, Co11087, CoN11073, CoN11074		Co11005 (12.50%), Co11007 (20.00%), Co11012 (20.00%), Co11019 (20.00%), Co11020 (16.66%)		-
4	Standard Check	-	-	-	Co740 (22.22%) Co7219 (25.00%)	-

• *Figures in parenthesis shows per cent disease incidence*

Results:

Out of 32 genotypes including 2 standard checks (Co740 and Co7219) were screened against smut disease under artificial disease condition to evaluate their resistance. Fifteen (15) genotypes viz., Co11017, Co11018, CoN11071, CoN11072, CoT11366, CoN09072, Co11021, Co11022, Co11023, Co11024, CoM11085, CoM11086, Co11087, CoN11073, and CoN11074 were found resistant, 10 were found moderately susceptible, 5 were found susceptible and remaining 2 were found highly susceptible.

Project No.	: AICRP, PP 22
Title of the experiment	: Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties in Maharashtra State.
Objective	: To gather the information on sugarcane diseases naturally occurring in the area on varieties for compiling an all India disease status report, yearly.
Location of the experiment:	Maharashtra, VSI (Peninsular zone), Pune
Year of start	: 1989-90
Year of report	: 2015-16

Observations:

During Survey, the major and minor diseases of sugarcane were recorded on different commercially cultivated varieties of sugarcane in Maharashtra State. The sugarcane disease situation in Maharashtra is given in Table 2.

Important finding of the survey:

The brown rust - a foliar disease caused by *Puccinia melanocephala* Syd. & P. Syd is a very common disease observed on sugarcane since its reoccurrence in 1994 in Maharashtra. Majority of sugarcane varieties commercially grown in the state viz., Co86032, CoM0265, CoC671, CoVSI9805, VSI434 and Co92005 are observed susceptible to this disease. During the survey (year 2015), a unknown insect (stage - larva) was observed feeding on spores (Urediniospores) of *Puccinia melanocephala* on leaves of sugarcane variety CoM0265, CoC671, Co86032, CoVSI9805 and CoC671 in Pune, Ahmednagar, Kolhapur and Satara district. The spore feeder insect samples along with infected leaves were collected and studied in the laboratory. The feeding of the spores by the larvae of the insect was confirmed by the microscopic observations. Dr. R.M.SHARMA, Ex. Scientist-D, Zoological Survey of India, Pune identified the insect feeder as *Mycodiplosis coimbatorensis*. This insect feeder was not reported so far from Maharashtra on the leaves of sugarcane infected with brown rust disease. The life cycle of the insect feeder & other parameters related to the efficacy and other things will be studied in next year.

Table 2: Major and minor diseases recorded on different commercially cultivated varieties of sugarcane in Maharashtra State 2015-16

Sr. No.	Disease	Name of area surveyed	% Disease incidence	Varieties affected	Crop Stage when observed	Any other information
1	Whip Smut	Throughout Maharashtra	up to 5 %	Co86032, CoC671, CoM 0265	All stages	The incidence of the disease in Marathawada, Khandesh and Vidarbha region is more as compared to other area.
2	Grassy Shoot	Throughout Maharashtra	Up to 15 %	CoC671, Co86032, CoM0265, CoVSI9805, VSI 434, Co92005	All crop stages	The incidence of GSD is increasing in almost all the varieties of sugarcane in Maharashtra.
3	Pineapple	Throughout Maharashtra	Up to 5 %	All the commercial varieties	Germination	Observed in ill-drained soils.
Foliar Diseases and abnormality						
1	Pokkah boeng	Throughout Maharashtra	Up to 10 % (Leaf basis)	CoC671, CoVSI 9805, CoM 0265 CoVSI434, Co86032	Monsoon period, especially severe in suru season planted crop.	Disease stages viz., Chlorosis, top rot and knife cut stages (below 1 %). Due to drought & low humidity the incidence of the disease was low.
2	Rust	Throughout Maharashtra	Up to 15 % (Leaf basis)	CoC671, CoVSI 9805, VSI 434, Co92005, CoVSI 434, Co86032, CoM 0265	After the monsoon period.	The disease is being observed throughout the year. <i>The brown rust spore feeder insect i.e. Mycodiplosis coimbatorensis was observed in Pune, Ahmednagar, Kolhapur and Satara district on infected leaves of sugarcane .</i>
3	Eye spot	Throughout Maharashtra	Up to 10 % (Leaf basis)	CoC671, Co86032, CoM0265, Co92005	After monsoon period and maturity period	The disease is restricted in Southern zone of the state.
4	Mosaic	Throughout Maharashtra	-	CoC671, Co86032,	Throughout the year	The disease incidence is minor.
5	Brown spot	Throughout Maharashtra	Up to 15 %	CoM0265, Co86032	The incidence is being noticed throughout the year but the intensity is low during the year.	The severity of the disease was more in CoM0265 as compared with Co86032 in Southern Maharashtra.

Project No.	: AICRP PP 28 (b)
Title of the Project	: Methodology for screening sugarcane genotypes for resistance to brown rust (<i>Puccinia melanocephala</i>)
Objective	: To standardize methodology for inoculation of urediniospores of brown rust and rating of resistance.
Year of start	: 2013-14
Location	: Vasantdada R & D Farm, VSI,Pune
Date of Planting	: 07.01.2015
Date of Inoculation	: 12.08.2016

Inoculation methodology:

- a. Clip inoculation in leaf whorl:** After brown rust appearance in field on CoVSI 9805, selected rust affected leaves and leaf bits measuring 8 cm were prepared. Inserted 3 clips in the leaf whorl of each shoot of ten rust-free plants of this variety.
- b. Leaf whorl inoculation:** After initiation of brown rust in field on CoVSI9805, collected rust affected leaves. Suspension of urediniospores in sterilized distilled water was prepared. Poured 1 ml freshly prepared urediniospore suspension in each leaf whorl of same variety. Inoculated 10 clumps (three shoots per clump) of same variety.

Observations: After one months period after inoculation recorded the symptoms of brown rust on leaves by counting average number of rust pustules per square inch and number of leaves bearing rust pustules.

Table 3: Inoculation method wise rust pustules on inoculated leaves

Clip inoculation method		Leaf whorl method	
Shoot Number	No.of rust pustules per sq.inch (Av.of 3 leaves)	Shoot Number	No. of rust pustules per sq.inch (Av. of 3 leaves)
1	17	1	27
2	16	2	25
3	16	3	29
4	12	4	31
5	15	5	25
7	13	7	25
8	15	8	26
9	13	9	24
10	16	10	30
Total	132	Total	242
Average	13.20	Average	24.20

Results: After one month of inoculation the observations regarding the number of pustules on leaves were recorded. Observations in Table No.3 indicates that, out of 2 methods, number of rust pustules on inoculated were higher (24.20/sq.inch²) under leaf whorl method. In clip inoculation, the average numbers of rust pustules per square inch were 13.20. Therefore, leaf whorl inoculation method is far superior over clip inoculation method.

Project No.	: AICRP: PP31
Title of the Project	: Screening, epidemiology and management of pokkah boeng in sugarcane
Title of the experiment	: A. Varietal Screening Screening of promising genotypes of sugarcane against the pokkah boeng disease of sugarcane
Location	: Vasantdada R & D Farm.
Date of Planting	: 17.01.2015
Date of Harvesting	: 18.02.2016
Soil type	: Medium Black
No. of treatments	: 12 genotypes/ varieties
Design of the experiment	: Rod Row trial. No. of replications : 2
Plot size	: Two rows of 6 m length, spacing bet ⁿ rows:120 cm
Treatment Details	: As per the AICRP (S) program, 12 genotypes were screened against pokkah boeng disease in sugarcane under natural condition.

Results:

The data regarding disease incidence (%) of genotypes, tested against pokkah boeng disease under natural condition presented in Table 4. Out of the 12 genotypes varieties / genotypes, 6 viz., Co85004, CoM0265, CoVSI03102, Co86032, CoVSI0309 and Co94012 were observed free from the disease, while remaining 6 varieties/ genotypes viz., CoVSI9805, CoC671, VSI434, CoVSI0405, CoVSI2000-01 and Co419 were found susceptible.

Table 4: Variety wise incidence of pokkah boeng disease under natural condition.

Sr. No.	Name of the variety	% Disease Incidence	Sr. No.	Name of the variety	% Disease Incidence
1	CoVSI9805	37.50 %	7	Co85004	0.0
2	VSI434	8.33%	8	CoVSI0309	0.0
3	CoC671	30.00 %	9	CoM0265	0.0
4	Co86032	0.0	10	CoVSI03102	0.0
5	Co419	33.33 %	11	CoVSI2000-01	16.16
6	CoVSI0405	35.70 %	12	Co94012	0.0

B. Epidemiology of disease

The incidence of pokkah disease was initiated late in the first week of July 2015. This area received pre-monsoon rains in 1st fortnight of June. May (Meteorological week – 22th). The minimum and maximum temperature of 22.43 °C and 32.69°C respectively was noted during these meteorological weeks, average humidity was 72.22 %. The incidence of the disease was reduced after 35th meteorological week.

Result and discussion:

i. Germination

The germination of sugarcane is influenced significantly due to fungicides treatments before planting. Maximum germination (69 %) was recorded in T-1 (Sett treatment - Overnight soaking of setts in carbendazim solution @ 0.1% a.i.). It is followed by T3 (Sett treatment + Three foliar sprays with carbendazim).

ii. Total height of cane

The total height of cane was highly influenced by all the treatments under study. The results are significant. The total height of cane was maximum (i.e 270.40 cm) in T4 (Three foliar sprays of mancozeb @ 0.3% at an interval of 15days interval from 15th May.) followed by T3 (Sett treatment and Foliar spray with carbendazim).

iii. Mill able height of cane:

There was significant difference in treated and untreated plots. The mill able cane height was maximum in T4 *i.e.* 239.00 cms.

iv. Yield of cane:

The cane yield differed significantly due to various treatments under study. The cane yield was maximum in T4 *i.e.* 126.00 t/ha.

v. CCS (t/ha.):

There is significant difference in treated and untreated plots. The CCS (t/ha.) was found maximum in T4 *i.e.* 21.05 t/ha.

vi. Disease control:

There is significant difference in treated and untreated plots. The maximum disease control (64.94 %) was obtained by 3 foliar spray of Mancozeb @ 0.3% at an interval 15 days from 15th May. However, carbendazim use by 3 sprays is also found beneficial to control the disease effectively.

Conclusion:

Both the fungicides *viz.*, Carbendazim and mancozeb are found effective to control pokkah boeng disease effectively when these two fungicides are sprayed thrice after 15th may onwards. However, mancozeb found more effective than the carbendazim

PP 32 : **Management of brown spot disease of sugarcane**
Objective : To find out effective method of brown spot management through chemicals.
Year of Start : 2015-16
Location : Vasantdada R & D Farm.
Date of Planting : 17.01.2015
Date of Harvesting : 14.03.2016
Soil type : Medium Black
No. of treatments : 5
Design of the experiment : Randomized Block Design (RBD)
No. of replications : 3
Plot size : 6 X 7 sq. Mt.

Treatment :

I. Variety : Brown spot susceptible variety CoM 0265

II. Fungicides

T.1	- Propiconazole	-	0.1 %
T.2	- Hexaconazole	-	0.1 %
T.3	- Triadimefon	-	0.1 %
T.4	- Mancozeb	-	0.3 %
T.5	- Carbendazim	-	0.1 %
T.6	- Control (Untreated)	-	-

III. Time of application of fungicides: To be applied just after appearance of brown spot lesions followed by two sprays at 15 days interval.

Observations:

1. Germination %
2. Disease incidence% (No. of clumps showing disease / total no. of clumps x 100)
3. Disease severity (% leaf area covered with brown spot lesions based on observations of 10 leaves per clump; total no. of clumps to be observed at least 10)
4. Cane yield per plot and per hectare
5. Brix, Pol %, Purity and CCS %
6. Cost-benefit ratio

** The incidence of the disease was not observed throughout the year (crop period) and hence the treatments were not imposed so far. During 2015-16 planting season this trial has been conducted in the operational area of the Sarsenapati Santaji Ghorpade Sugars Ltd., Kagal, Dist. Kolhapur where the disease is being observed every year.*

VASANTDADA SUGAR INSTITUTE, PUNE

Agriculture Meteorological Data from January 2015 to December 2015

Month	Air temperature (°C)		Average Relative Humidity (%)	Rainfall (mm)	No. of rainy days
	Min	Max			
January 2015	8.18	31.58	61.83	0.20	01
February 2015	9.67	35.80	51.26	20.80	01
March 2015	18.99	36.18	59.46	47.80	08
April 2015	17.39	39.03	46.59	9.40	02
May 2015	22.71	38.21	50.68	15.00	02
June 2015	22.43	32.69	72.22	221.60	06
July 2015	22.65	30.86	75.82	38.00	23
August 2015	21.53	31.51	75.76	19.40	27
September 2015	19.93	33.51	76.21	188.20	16
October 2015	19.34	33.46	72.46	67.80	12
November 2015	14.43	32.34	70.59	121.40	01
December 2015	10.41	32.04	70.03	0.40	03
TOTAL				749.60	102