

VASANTDADA SUGAR INSTITUTE, PUNE, MAHARASHTRA

Annual report of AICRP (S) of Plant Pathology discipline for the year 2011-12

Project No	: (AICRP- PP17-B)
Title of the experiment	: Evaluation of zonal varieties for resistance to smut disease under artificial disease conditions.
Objectives	: To gather information on the relative resistance to smut of the entries in zonal varietal trial of the peninsular zone.
Year of commencement	: 1994-95
Year of report	: 2011-12
Location of the experiment	: VSI, Pune
Date of planting	: 03.02.2011
Date of harvesting	: 05.02.2012
Type of soil	: Medium black
Plot No	: C 5, Vasantdada R & D Farm, VSI, Pune
No. of varieties	: 45 +5 standards (Table: 1)
No. of replications	: 2
Design of the experiment	: Rod row trial
Inoculum	: <i>Ustilago scitaminea</i> teliospores collected from commercially cultivated Co 740 and Co 7219 varieties served as source of inoculum.
Method of inoculation	: The method of inoculation consists of dipping of 2 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 Mt. lengths, spacing between rows 120 cms.
Observations	: I) Number of healthy and smut affected stools per row were recorded for disease reaction II) Smut incidence was recorded at fortnightly intervals up to the harvest

Table: 1. Varieties under testing at VSI (ZVT's 2009-10)

Sr. No.	Trial	Varieties
1	Initial Varietal Trial – Early (10)	Co06001, Co06002, Co06010, Co06022, Co6024, CoM06082, CoSnk06101, MS06081, PI06131, PI06132
2	Advanced Varietal Trial – Early I Plant (6)	Co05001, Co05002, CoN05071, CoSnk05101, CoSnk05103, CoM05082
3	Advance Varietal Trial II Plant Early (5)	CoSnk03632, CoN03131, Co0403, CoM0326, CoSnk03754,
4	Initial Varietal Trial -Midlate (12)	Co06007, Co06012, Co06013, Co06014, Co06015, Co06020, Co6026, Co06027, CoM06084, CoM06086, CoSnk06104, CoVc06061
5	Advanced Varietal Trial Midlate I Plant (6)	Co05007, CoSnk05104, CoVSI05121, CoVSI05122, CoVSI05123, CoSnk05105
6	Advance Varietal Trial II Plant Midlate (6)	CoSnk03822, Co0409, CoM0316, Co0416, Co0415, MS0301
	Standards	Co94008, Co7219, Co86032, Co85004, CoC671

Results:

The data regarding percent disease incidence and disease reaction was furnishes in Table 2. Data reveals that, out of 50 genotypes including 5 checks were screened for their resistance to smut disease under artificial disease condition at VSI, Pune, 18 genotypes were found resistant (R), 11 genotypes were found moderately resistant (MR), 14 genotypes found moderately susceptible (MS), 2 genotypes found susceptible (S) and 5 genotypes were found highly susceptible (HS).

Table 2: Disease incidence (%) and Disease reaction of genotypes against smut disease under artificial disease conditions

Sr. No	Name of the trial	Smut disease incidence and disease reaction				
		Resistant (R)	Moderately Resistant (MR)	Moderately Susceptible (MS)	Susceptible (S)	Highly Susceptible (HS)
1	Initial Varietal Trial – Early (10)	Co06024, CosnK06101, MS06081, PI06131	Co06002 (6.25%),	Co06001 (10.80%), Co06022 (12.50%), Co06082 (14.29%),	PI06032 (21.59%)	Co6010 (58.13%),
2	Advanced Varietal Trial – Early I Plant (6)	Co05002, CoN05071	CoSnk05101 (7.14%)	Co05001 (16.67%), CoSnk05103 (11.69%), CoM05082 (16.25%)	-	-
3	Advanced Varietal Trial Early II Plant (5).	CoN03131, Co0403, CoM0326	CoSnk03754 (2.94%)			CoSnk03632 (50.00%)
4	Initial Varietal Trial - Midlate (12)	Co06015, Co06026, Co06086, CoVc06061	Co06013 (5.56%), CoSnk06104 (10.00%),	Co06007 (17.14%), Co06012 (12.50%), Co06014 (16.67%), CoM06084 (16.60%),	-	Co06020 (39.29%), Co06027 (43.75%)
5	Advanced Varietal Trial Midlate I Plant (6)	Co05007, CoSnk05105	CoVSI05121 (6.25%), CoVSI05122 (5.00%), CoVSI05123 (7.14%)	-	CoSnk05104 (24.29%)	-
6.	Advanced Varietal Trial Midlate II Plant (06)	CoSnk03822, Co0409, MS0301	CoM0316 (3.84%), Co0416 (5.88%)	Co0415 (10.12%)		
	Standards: 5		Co94008 (9.12%)	Co7219 (12.50%), CoC671 (11.81%), Co85004(11.11%)		Co86032 (47.32%)

Project No.	: AICRP-S, PP22
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	: 2011-12

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 3

1. The incidence of rust disease was observed in CoC671, Co7527, Co94012, CoVSI9805, VSI434 and Co92005. The incidence of this disease was in severe form on CoVSI9805 in southern part of the state. In the past, the incidence of rust disease was observed particularly during monsoon and post monsoon periods, but now a day, excluding hot period during April and May months, the incidence was observed throughout the year.
2. The incidence of pokkah boeng disease was increasing in the state. During 2011-12, disease was recorded on Co86032, CoC671, Co94012, Co8014, VSI434, Co7219, CoM0265 and CoVSI9805. The knife cut stage of the disease was also recorded in monsoon period in some areas where, the disease was in severe stage.
3. The incidence of smut disease was recorded up to 5 % only in Co86032, Co8014 and CoC671 varieties. Smut disease incidence was increasing in Marathwada region particularly on Co86032, whereas its incidence was negligible in central and south Maharashtra.
4. Sugarcane Yellow Leaf Disease was observed in severe form on some of the genotypes under zonal testing at VSI. However, major varieties grown in the state were free from the disease.
5. Eye spot disease was mainly observed in south Maharashtra, whereas, its incidence was negligible in central and northeast part of Maharashtra.
6. Pineapple and sett rot diseases were noticed in ill-drained soils of south and central part of Maharashtra in all the commercial sugarcane varieties. The incidence was limited to the sugarcane setts only.
7. A new disease i.e. Brown spot caused by *Cercospora longipes* was observed in Southern districts of the state on CoM0265 and Co86032. The severity of the disease was more in CoM0265 in Kolhapur District.
8. Leaf scorching / leaf burning – an abnormality due to severe cold accompanied with cold wind was observed during 2nd week of February 2012 in Pune,

Ahmednagar and Nasik districts on Co86032, CoM0265 and CoVSI9805. Leaf scorching / leaf burning effect was limited to the young crops (3 to 4 months crop) only. The ratoon crops of Co86032 were severely damaged by the cold. In some of the plots, drying of whole leaves and stalks was observed.

9. Banded chlorosis / cold chlorosis/ cold injury - a physiological disorder / abnormality was noticed in Adsali crops in 2nd week of March 2012 on Co86032 and CoC671. The typical symptoms of this abnormality were light- green to white or yellow horizontal patches/ bands on younger leaves (1st, 2nd and 3rd leaf from top). The single patch of 2 to 3 inch length was observed on individual leaf. Drying of whole leaves or stalks was not observed in Adsali crops. However, the losses in cane yield were not visible due to banded chlorosis. This effect is due to sudden drop in temperature.

Table 3: Major and minor diseases recorded on different commercially cultivated varieties of sugarcane in Maharashtra State.

Sr. No.	Disease	Name of area surveyed	% Disease incidence (Clump basis)	Varieties affected	Crop Stage when observed	Any other information
1	Whip Smut	Dist.: Latur, Jalna, Beed, Jalgaon, Wardha, Nagpur	7 to 8 %	Co86032, Co7219, Co740	All stages	The incidence of the disease in Marathawada and Vidarbha region is increasing.
2	GSD	Throughout Maharashtra	Up to 5 %	CoC 671, Co86032. Co 8014, CoM 0265, Co94012, VSI 434,	All crop stages	-----
3	Pineapple	Throughout Maharashtra	3 %	CoC671, Co86032	Germination	Observed in ill-drained soils.
4	Sett rot	Central and North-East part	-	CoC671, Co86032, Co8014	Germination	Observed in ill-drained soils.
Foliar Diseases						
1	Pokkah boeng	Throughout Maharashtra	10 % (Leaf basis)	CoC671, Co7527, Co94012, CoVSI 9805, CoM 0265 CoVSI 434, Co86032	Monsoon period, especially severe in suru crop	Chlorosis, top rot and knife cut stages were noted.
2	Rust	Throughout Maharashtra	5 % (Leaf basis)	CoC671, Co7527, Co94012, CoVSI 9805, VSI 434, Co92005.	After monsoon period.	The disease is being observed to a lesser extent in summer and winter seasons.
3	Eye spot	Southern Zone: Kolhapur, Sindudurg, Sangli, Satara districts	5 % , Leaf basis	CoC671, Co7527, Co 94012, Co8014, Co740, Co7219, Co 86032, CoM0265	After monsoon period	The disease is restricted in Southern zone.
4	Banded chlorosis	South and Central part of Maharashtra	-	CoC671, Co86032, CoM0265	February, March	Light- green to white or yellow horizontal patches/ bands on younger leaves. The single patch of 2 to 3 inch length was observed on individual leaf.
5	Mosaic	Throughout Maharashtra	-	Co740, Co7219. Co94012, CoC671,Co86032,VSI434	Throughout the year	
6	Sugarcane yellow leaf disease.	VSI, Pune	Severe	Co 07020, Co 06001, Co 06002, Co 06007,	10 months age	Observed only on varieties under ZVT's. Other commercial varieties were free from SYLD.

7	Brown spot caused by <i>Cercospora longipes</i>	South Maharashtra- Kolhapur and Sangli Districts		CoM0265, Co86032	After monsoon season	A new disease i.e. Brown spot caused by <i>Cercospora longipes</i> was observed in Southern districts of the state on CoM0265 and Co86032. The severity of the disease was more in CoM0265 in Kolhapur District.
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Project No.	: AICRP, PP – 28
Title of Project	: Management of rust disease of sugarcane.
Title of Experiments	: Management of Rust disease of Sugarcane.
Objectives	; To find out the effective method of rust management.
Location	: VSI, Pune
Year of start	: 2004-2005
Experimental Details	: Ist Year: 2007-08, DP: 14.02.2008, DH: 16.01.2009 IInd Year: 2009-10, DP: 28.01.2010. DH: 01.04.2011 IIIrd Year: 2010-11, DP: 15.02.2011/ DOH: 16.02.2012
Year of Report	: 2011-2012 (Pooled Data of 3 years)
Experimental Details	: RBD / R-3 / T9
Variety of sugarcane	: CoVSI9805
Treatment details	: Fungicides
	T1: Chlorothalonil (Kavach) - 0.25%
	T2: Propineb (Antracol) - 0.25%
	T3: Triadimefon (Bayleton) - 0.10%
	T4: Captaf (Captan) - 0.25%
	T5: Mancozeb (Dithane M-45) - 0.20 %
	T6: Tridemorph (Callixin) - 0.10%
	T7: Hexaconazole (Contaf) -0.10 %
	T8: Propiconazole (Tilt) -0.10%
	T9: Control (untreated)

III Time of application of fungicides

Spraying of the fungicides were done when rust the disease was observed and consecutive three sprays at an interval of 12 days (as per the AICRP (S) Programme)

11. Method of observations:

Observations regarding disease incidence were recorded before each spray. The percent disease incidence was worked on the basis of number of infected and disease free leaves per cane. Ten (10) canes in each treatment were selected randomly for the observations. The other observations regarding the different parameters were recorded at the time of harvesting of the crop. The pooled data of three years is presented in Table 4 and Table 5.

Result and discussion:

1. **Yield of cane:** The cane yield differed significantly due to various treatments under study. The cane yield was recorded maximum in T2 (Propineb –Antracol, 0.25%) i.e. 100.32 t/ha. This was significantly superior over the control (83.69 t/ha). The second best treatment T5 (Mancozeb (Dithane M-45), 0.20%) also showed similar trend as that of T2.
2. **Per cent disease incidence:** The disease incidence was observed minimum in T2 (Propineb-Antracol, 0.25%) i.e. 18.11% after 3rd spray of fungicide, which was significantly lowest than all other treatments under study including control.
3. **Per cent disease control:** There was significant difference in treated and untreated plots. The maximum disease control was observed in T2 (Propineb-Antracol, 0.25%) i.e. 67.38 %, which was significantly superior over rest of the treatments including control.
4. **Gross Monetary return (Rs. /ha):** Maximum gross return was obtained in T2 (Propineb-Antracol, 0.25%) i.e. Rs. 234600 per hectare, whereas in control it was Rs. 196000 per hectare.
5. **Net Monetary Return (Rs./ha):** Maximum net monetary return was obtained in T2 (Propineb-Antracol, 0.25%) i.e. Rs. 151800 per hectare, whereas in control it was Rs. 120900 per hectare
6. **Benefit Cost Ratio:** The BC ratio (2.83) was recorded maximum in T2 (Propineb - Antracol, 0.25 %).

13. Conclusion:

All the fungicides viz. chlorothalonil (Kavach @ 0.25%), Propineb (Antracol @ 0.25%), Triadimefon (Bayleton @ 0.10 %) Captaf (Captan @ 0.25%), Mancozeb (Dithane M-45 @ 0.20%), Tridemorph (Callixin @ 0.10%), Hexaconazole (Contaf @ 0.10%) and Propiconazole (Tilt @ 0.10%) are found effective in minimizing the rust disease incidence. But none of the fungicides found effective to control the rust disease cent percent. However, Propineb (Antracol) at 0.25% was found superior over all the fungicides for controlling the disease.

RECOMMENDATION:

Three sprays of 0.25 % Propineb at an interval of 12 days after the initiation of disease is recommended for effective control of the rust disease of sugarcane caused by *Puccinia melanocephala*.

Table 4: Pooled data of yield of sugarcane and rust disease control as influenced by different fungicides.

T. N.	Treatments	Yield (t/ha)			Pooled Mean	Percent Disease Incidence			Pooled Mean	Percent disease control			Pooled Mean
		08-09	09-10	10-11		08-09	09-10	10-11		08-09	09-10	10-11	
1.	Chlorothalonil - 0.25%	87.77	94.00	98.52	93.42	29.78 (33.06)	32.81 (34.95)	22.35 (28.20)	28.31 (32.07)	58.58 (49.94)	40.01 (39.23)	49.49 (44.71)	49.36 (44.62)
2.	Propineb - 0.25 %	97.12	101.54	102.31	100.32	19.26 (26.03)	18.54 (25.48)	16.54 (23.93)	18.11 (25.14)	73.22 (58.84)	66.18 (54.46)	62.74 (52.42)	67.38 (55.24)
3.	Triadimefon - 0.10 %	85.40	91.42	93.24	90.02	31.28 (33.99)	33.15 (35.15)	24.94 (29.92)	29.78 (33.02)	56.50 (48.74)	39.49 (38.93)	43.60 (41.27)	46.53 (42.98)
4.	Captaf - 0.25 %	85.11	90.51	90.37	88.66	35.73 (36.69)	38.41 (38.28)	24.26 (29.50)	32.79 (34.82)	50.24 (45.14)	29.66 (32.69)	45.19 (42.23)	58.62 (40.02)
5.	Mancozeb - 0.20 %	96.03	96.63	96.39	96.35	24.55 (29.69)	25.54 (30.34)	19.15 (25.92)	23.07 (28.65)	65.83 (54.24)	53.24 (46.87)	56.79 (48.92)	51.74 (50.00)
6.	Tridemorph - 0.10 %	85.06	92.59	91.57	89.74	33.14 (35.14)	29.00 (32.57)	20.11 (26.57)	27.41 (31.42)	53.85 (47.21)	46.97 (43.25)	54.42 (47.58)	43.22 (46.01)
7	Hexaconazole -0.10 %	84.55	91.20	91.67	89.14	37.84 (37.94)	36.20 (36.98)	22.80 (28.49)	32.28 (34.47)	47.25 (43.41)	33.80 (35.50)	48.64 (44.22)	40.33 (41.04)
8	Propiconazole -0.10 %	83.07	91.47	92.96	89.16	39.97 (39.21)	36.25 (37.01)	25.24 (30.14)	33.81 (35.45)	44.38 (41.77)	33.68 (35.42)	42.95 (40.93)	43.07 (39.37)
9	Control (Untreated)	79.57	81.33	90.19	83.69	71.90 (58.00)	54.74 (47.72)	44.32 (41.74)	56.98 (49.15)	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)
	S.E. ±	1.15	3.46	3.72	1.74	0.86	0.89	1.03	0.53	1.10	1.68	1.88	0.91
	CD at 5%	3.47	10.39	11.17	4.94	2.57	2.67	3.09	1.52	3.31	5.03	5.65	2.61
	C.V.%	2.30	6.50	6.85	5.72	4.06	4.36	6.08	4.77	4.38	7.92	8.02	6.82

- *Figures in parenthesis shows arcsine transformed values*

Table 5: Economics of different fungicides on monetary returns of sugarcane (pooled)

T. N.	Treatments	Gross Returns (Rs.'0000 ha ⁻¹)			Pooled Mean	Cost of Cultivation (Rs.'0000 ha ⁻¹)			Pooled Mean	Net Returns (Rs.'0000 ha ⁻¹)			Pooled Mean	B:C Ratio
		08-09	09-10	10-11		08-09	09-10	10-11		08-09	09-10	10-11		
		1.	Chlorothalonil - 0.25%	17.55		23.50	24.63	21.89		7.84	8.58	9.57		
2.	Propineb - 0.25 %	19.42	25.39	25.58	23.46	7.46	8.20	9.19	8.28	11.96	17.18	16.39	15.18	2.83
3.	Triadimefon - 0.10 %	17.08	22.86	23.31	21.08	7.85	8.59	9.58	8.67	9.23	14.27	13.73	12.41	2.43
4.	Captaf - 0.25 %	17.02	22.63	22.59	20.75	7.44	8.18	9.17	8.26	9.59	14.45	13.43	12.49	2.51
5.	Mancozeb - 0.20 %	19.21	24.16	24.10	22.49	7.40	8.14	9.13	8.23	11.80	16.02	14.96	14.26	2.73
6.	Tridemorph - 0.10 %	17.01	23.15	22.89	21.02	7.37	8.11	9.10	8.19	9.64	15.04	13.79	12.83	2.56
7.	Hexaconazole - 0.10 %	16.91	22.80	22.92	20.88	7.24	7.98	8.97	8.07	9.67	14.82	13.94	12.81	2.58
8.	Propiconazole -0.10 %	16.61	22.87	23.24	20.91	7.45	8.19	9.18	8.27	9.16	14.68	14.06	12.63	2.52
9.	Control (Untreated)	15.91	20.33	22.55	19.60	6.68	7.42	8.41	7.51	9.23	12.91	14.13	12.09	2.61
	S.E. ±	2315.62	8665.89	9316.94	4311.03	-	-	-	-	2315.62	8665.89	9316.94	4311.03	-
	CD at 5%	6942.20	25980.15	27931.98	12258.33	-	-	-	-	6942.20	25980.15	27931.98	12258.33	-
	C.V.%	2.30	6.50	6.85	6.06	-	-	-	-	4.01	10.06	11.21	9.87	-