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VARIETAL RESPONSE AND THEIR EFFECTS ON VARIOUS CANE CHARACTERISTICS DUE TO SUGARCANE WILT DISEASE INDUCED BY FUSARIUM SACCHARI

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Wilt is a severe sugarcane disease causing major economic losses, second only to red rot. It drastically reduces yield and is a significant challenge for sugar industries, particularly in northern Bihar, where its prevalence ranges from 5% to 80%. A study of 36 sugarcane varietal response revealed that 20% were resistant, 28.58% moderately resistant, 37.14% moderately susceptible, and 14.29% susceptible to wilt disease. Among these, CoP 9301 was the most resistant, followed by CoP 22441 and CoP 19436, making them suitable for cultivation in wilt-prone areas. On the other hand, CoV 92102, CoSe 16453, and CoBIn 20501 were identified as susceptible. Wilt disease caused significant reductions in various sugarcane attributes, including germination percentage (3.68% to 36.47%), settling mortality (4.00% to 37.09%), cane height (5.31% to 28.63%), cane girth (2.69% to 38.67%), cane weight (4.44% to 42.59%), brix percentage (3.91% to 26.66%), sucrose percentage (6.89% to 48.86%), and purity percentage (3.03% to 30.35%).

Keywords: Fusarium sacchari, Qualitative and Quantitative parameters, Sugarcane, Varietal evaluation, and Wilt disease.

Introduction

Sugarcane (Saccharum officinarum L.) is a large, perennial tropical grass belonging to the Andropogoneae tribe within the Gramineae family, cultivated globally mainly for its sucrose content (Menossi et al., 2008). It is a polyploid plant primarily propagated through vegetative means using stalks with buds (Croft et al., 2008). This important crop is grown in over 110 countries for producing sugar, ethanol, and bioenergy, mostly in tropical and subtropical areas. Brazil is the top producer, accounting for 38% of global output, followed by India with 22% (FAO, 2022). As the second-largest producer, India cultivates sugarcane on 5.15 million hectares, producing 405.39 million tons annually (FAO, 2022). The crop contributes to about 80% of global sucrose production, valued at around US\$150 billion each year (Ali et al., 2019), and supports roughly 12.34 million

farmers and workers (Ram and Hemaprabha, 2020). India grows sugarcane on 58.85 lakh hectares, producing 490.53 million tonnes with a productivity rate of 83.3 tonnes per hectare. Uttar Pradesh is the leading producer with 27.95 lakh hectares, yielding 224.24 million tonnes at 80.24 tonnes per hectare. Bihar ranks sixth, cultivating sugarcane on 2.10 lakh hectares, producing 12.74 million tonnes with a productivity rate of 60.62 tonnes per hectare (ISMA, 2024).

Sugarcane is a valuable crop but is significantly affected by diseases, with approximately 55 identified in India (Rao *et al.*, 2002; Rott *et al.*, 2000). These diseases result in a reduction of about 10-15% in the nation's sugar production (Viswanathan & Rao, 2011). Mill tests in Motihari, East Champaran, Bihar, showed a 9.97% decrease in sugar recovery with a 6% disease incidence, while Motipur showed a 10.61% decrease with 13%

affected canes (Viswanathan et al., 2012). In Bihar, over 20 diseases, including red rot, wilt, pokkahboeng, smut, leaf spot, and ratoon stunting, have been reported, with red rot and wilt recently emerging as major issues (Minnatullah et al., 2022). Wilt, affecting various commercial sugarcane varieties, is particularly problematic, causing significant declines in cane production and overall productivity. In Bihar, the prevalence of wilt disease varies from 5% to 80% across different sugar factory areas (Minnatullah et al., 2021 & 2022). Wilt disease causes notable losses in germination rates (6.14%-38.20%), seedling mortality (4.55%-41.24%), cane height (6.66%-27.83%), cane girth (2.67%-45.16%), cane weight (6.40%-47.27%), brix (4.04%-25.58%), sucrose (6.96%-49.16%), and purity (3.04%-31.69%) (Aaradhana & Minnatullah, 2024).

Materials and Methods

During the cropping season of 2023-2024 field experiments were carried out at Research Farm, SRI, RPCAU, Pusa, geolocated at 25.98' N latitude and 85.67' E longitude and 52.0 meters high from mean sea level. The plug method of inoculation was used for artificial inoculation. Thirty-five sugarcane varieties, excluding the check variety (CoV 92102), were planted using threebudded setts in a wilt-sick plot, with a row-to-row distance of 90 cm in the field. This experiment was conducted in three replications, and normal agronomic practices were followed in the first week of February. At 180 days after planting, the pathogen was introduced into the 3rd internode from the bottom by making a bore-hole with an iron inoculator. A 0.5 ml conidial suspension $(1 \times 10v)$ spores/ml) was injected using a sterile needle at the 6 to 7 internode stages. The bore-hole was then sealed with the removed tissue core, and waxed paper was applied to the injection site to prevent contamination.

After those observations on disease development were recorded for each variety to assess their response to the pathogen. The varieties were evaluated using the disease rating scale of AICRP on Sugarcane (0-4).

Observations

- 1. Germination Count at 45 Days After Planting:
- The number of buds that successfully germinated 45 days after planting was recorded.
- 2. Appearance of Wilt Symptoms on Standing Canes (on Clumps):
- The presence and severity of wilt symptoms on the standing canes were observed and noted for each clump.
- 3. Wilt Severity Index Assessment

• After 10 months, ten clumps were uprooted along with their roots. All the canes from these clumps were split open longitudinally, and the wilt severity index was scored on a 0-4 scale based on the following criteria:

The evaluation utilized a 0-4 scale

0. Healthy canes and roots with no external or internal 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 the 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 internal tissues throughout the entire length of the cane except the top. Severe pith and cavity formation. Sparse fungal growth observed in the pith cavities.
- 4. Complete yellowing and death of the leaves, marked stunting, shrinking and drying of the stalk and rind, dark brown discolouration of internal tissues extending throughout the entire length of the cane. Large pith cavities with profuse overgrowth of the associated fungi. Most of the roots necrotic with dark discolouration dislodge easily from the stalks. Roots mildly discoloured and slightly necrotic.

The mean wilt severity index is worked out based on the number of cane samples.

Mean wilt	Sum of wilt indices of individual stalks
severity index $=$	Number of stalks samples

The scale and disease reaction were categorized according to the All India Coordinated Research Project (AICRP) on Sugarcane as follows:

S.No.	Scale range	Disease reaction
01.	0.0-1.0	R
02.	1.1-2.0	MR
03.	2.1-3.0	MS
04.	3.1 and above	S

The extent of losses on various cane parameters due

S.	T 7 • 4•	Disease	Disease
No.	varieties	score	Reaction
1	CoP 19437	2.84	MS
2	CoP 19438	2.41	MS
3	CoP 19440	2.28	MS
4	CoP 19436	0.44	R
5	CoP06436	2.25	MS
6	CoP 19459	1.54	MR
7	CoP 19441	1.36	MR
8	CoBln 20501	3.68	S
9	CoBln 17501	3.42	S
10	CoBln 17502	3.61	S
11	CoBln 19501	2.93	MS
12	Co0238	3.54	S
13	CoP 20440	2.20	MS
14	BO 153	1.28	MR
15	CoSe 18451	2.64	MS
16	CoLk 20466	2.56	MS
17	CoP 20436	1.20	MR
18	CoP 20438	1.38	MR
19	CoP 20437	2.74	MS
20	CoSe 18452	2.38	MS
21	CoP 9301	0.38	R
22	CoP 20439	0.67	R
23	CoLk 20469	1.23	MR
24	CoLk 20468	1.74	MR
25	CoP 22439	0.62	R
26	CoP 22436	0.48	R
27	CoP 22438	1.30	MR
28	CoP 22437	1.67	MR
29	CoP 22440	0.91	R
30	CoP 22442	1.25	MR
31	CoP 22441	0.40	R
32	CoP 18436	2.46	MS
33	CoLk 94184	2.32	MS
34	CoSe 16453	3.76	S
35	CoLk 16467	2.79	MS
36	CoV 92102 (Check)	4.00	S
	R-Resistant, MR-M MS- Moderately Susc	oderately Resi	stant, ceptible

 Table 1:
 Evaluation of sugarcane varieties under field condition against *Fusarium sacchari*.

to wilt disease were also assessed. The plantings were completed in February, with one plot maintained under natural conditions. The sugarcane varieties were inoculated by Plug method of inoculation in three replications. The varieties were evaluated based on germination count at 45 days, settling mortality at 60 days, and disease incidence at 120 days. Upon harvest, data were collected on three quantitative parameters: cane height (cm), cane girth (cm), and cane weight (kg), and three qualitative parameters: sucrose %, brix %, and purity %. Juice samples from both diseased (inoculated) and healthy (non-inoculated) canes were analyzed for quality, with sucrose % measured using a polariscope, brix % assessed with a brix hydrometer, and purity calculated according to Browne and Zerban (1941) and Spancer and Meade (1955).

The reduction and purity coefficient were calculated as follows respectively:

Reduction % =
$$\frac{H - D}{H} \times 100$$

Where,

H - Healthy canes,

D - Diseased canes

Purity Coefficient =
$$\frac{Sucrose(\%)}{Brix(\%)} \times 100$$

Results and Discussion

Evaluation of sugarcane varieties in field condition against sugarcane wilt disease

In a study evaluating 36 sugarcane varieties, including the check variety CoV 92102, for resistance to Fusarium sacchari, the causal agent of sugarcane wilt, the plug method of inoculation was used. Results dipicted in Table 1 and 1(a) showed that seven varieties, including CoP 9301, CoP 22441, and CoP 19436, exhibited a resistant reaction. Ten varieties, such as CoLk 20469, BO 153, and CoP 22442, displayed a moderately resistant reaction. Thirteen varieties, including CoP 20440, CoLk 94184, and CoSe 18452, were classified as moderately susceptible. Six varieties, such as Co 0238 and CoV 92102, were found to be susceptible to the disease. Overall, 20% of the varieties showed a resistant reaction, 28.58% were moderately resistant, 37.14% were moderately susceptible, and 14.29% were susceptible to wilt disease. The results, similar to those of Kumar et al., (2011), showed that out of the 47 genotypes tested, 31 were resistant or moderately resistant to both red rot pathotypes using the plug method, while 32 genotypes were resistant to both pathotypes with the nodal method, and the

Table 1(a):Varieties exhibiting various levels of disease reaction
to *Fusarium sacchari* under field conditions.

S.	Rating	Disease	Number	Percentage
No.	Score	Reaction	of Varieties	(%)
01	0.0 - 1.0	R (Resistant)	7	20.00
		MR		
02	1.1-2.0	(Moderately	10	28.58
		Resistance)		
		MS		
03	2.1 - 3.0	(Moderately	13	37.14
		Susceptible)		
04	3.1 and	S	5	14.20
04	above	(Susceptible)	3	14.29

S.	T 7 • 4•	Disease	Rat-	Germination %			Settling Mortality %				
No.	Varieties	Score	ing	Н	D	Red ⁿ H		D	Red ⁿ		
1	CoP 19437	2.84	MS	28.82(32.47)	24.12(29.41)	16.30(23.81)	09.43(17.88)	11.95(20.22)	21.08(27.33)		
2	CoP 19438	2.41	MS	29.53(32.92)	25.11 (30.07)	14.96(22.75)	09.21(17.67)	11.34(19.68)	18.78(25.68)		
3	CoP 19440	2.28	MS	30.68(33.63)	26.59(31.04)	13.68(21.71)	08.23(16.67)	10.02(18.45)	17.86(25.00)		
4	CoP 19436	0.44	R	40.23 (39.37)	38.72 (38.48)	03.72(11.12)	03.35(10.55)	03.53(10.83)	05.09(13.04)		
5	CoP06436	2.25	MS	30.21 (33.34)	26.02(30.67)	13.86(21.86)	08.54(16.99)	10.41 (18.82)	17.96(25.07)		
6	CoP 19459	1.54	MR	32.75(34.91)	29.88(33.14)	08.76(17.22)	05.93(14.09)	06.56(14.84)	09.60(18.05)		
7	CoP 19441	1.36	MR	33.78(35.54)	30.94 (33.80)	08.40(16.85)	05.24(13.23)	05.75(13.87)	08.86(17.32)		
8	CoBln 20501	3.68	S	27.23(31.45)	21.63 (27.72)	20.56(26.96)	11.23(19.58)	14.84(22.66)	24.32(29.55)		
9	CoBln 17501	3.42	S	28.12(32.02)	22.65 (28.42)	19.45(26.17)	09.62(18.07)	12.51 (20.71)	23.10(28.73)		
10	CoBln 17502	3.61	S	27.53(31.65)	21.92(27.92)	20.37(26.83)	10.56(18.96)	13.87(21.87)	23.86(29.24)		
11	CoBln 19501	2.93	MS	28.74(32.42)	23.97 (29.31)	16.59(24.04)	09.45(17.90)	12.16(20.41)	22.28(28.17)		
12	Co0238	3.54	S	27.94(31.91)	22.42 (28.26)	19.75(26.39)	10.02(18.45)	13.07(21.19)	23.33 (28.88)		
13	CoP 20440	2.20	MS	30.86(33.75)	26.67 (31.09)	13.57(21.62)	07.94(16.37)	09.34(17.80)	17.63(24.83)		
14	BO 153	1.28	MR	35.17(36.37)	32.58(34.81)	07.36(15.74)	04.36(12.05)	04.70(12.52)	07.23(15.60)		
15	CoSe 18451	2.64	MS	29.23(32.73)	24.75 (29.83)	15.32(23.04)	09.32(17.78)	11.64(19.95)	19.93(26.51)		
16	CoLk 20466	2.56	MS	29.31 (32.78)	24.84 (29.89)	15.25(22.99)	09.28(17.74)	11.51(19.83)	19.37 (26.11)		
17	CoP 20436	1.20	MR	34.54(35.99)	31.87 (34.37)	07.73(16.14)	04.49(12.23)	04.87(12.75)	07.80(16.22)		
18	CoP 20438	1.38	MR	33.67 (35.47)	30.78(33.70)	08.58(17.03)	05.56(13.64)	06.12(14.32)	09.15(17.61)		
19	CoP 20437	2.74	MS	28.94(32.54)	24.32 (29.55)	15.96(23.55)	09.41 (17.86)	11.83(20.12)	20.45 (26.89)		
20	CoSe 18452	2.38	MS	29.83 (33.10)	25.48(30.32)	14.58(22.45)	08.97(17.43)	10.98(19.35)	18.30(25.33)		
21	CoP 9301	0.38	R	40.86(39.73)	39.35 (38.85)	03.68(11.06)	03.12(10.17)	03.25(10.39)	04.00(11.54)		
22	CoP 20439	0.67	R	38.12(38.13)	36.43 (37.13)	04.40(12.11)	03.56(10.88)	03.79(11.23)	06.06(14.25)		
23	CoLk 20469	1.23	MR	35.48(36.56)	32.96(35.04)	07.10(15.45)	04.25(11.90)	04.56(12.33)	06.79(15.10)		
24	CoLk 20468	1.74	MR	32.23 (34.59)	29.37 (32.82)	08.87(17.33)	06.86(15.18)	07.75(16.16)	11.48(19.81)		
25	CoP 22439	0.62	R	38.45 (38.32)	36.85 (37.38)	04.16(11.77)	03.43(10.67)	03.64(11.00)	05.76(13.89)		
26	CoP 22436	0.48	R	39.65 (39.03)	38.14(38.14)	03.80(11.24)	03.38(10.59)	03.57(10.89)	05.32(13.34)		
27	CoP 22438	1.30	MR	34.34(35.87)	31.62(34.22)	07.92(16.35)	05.13(13.09)	05.57(13.65)	07.89(16.31)		
28	CoP 22437	1.67	MR	32.52(34.77)	29.64 (32.99)	08.85(17.31)	06.14(14.35)	06.86(15.18)	10.49(18.90)		
29	CoP 22440	0.91	R	37.79(37.93)	35.92 (36.82)	04.94(12.84)	03.67(11.04)	03.92(11.42)	06.37(14.62)		
30	CoP 22442	1.25	MR	34.92(36.22)	32.29 (34.63)	07.53(15.93)	04.42(12.14)	04.78(12.63)	07.53(15.93)		
31	CoP 22441	0.40	R	40.61 (39.59)	39.10(38.70)	03.72(11.12)	03.24(10.37)	03.40(10.63)	04.70(12.52)		
32	CoP 18436	2.46	MS	29.74(33.05)	25.37 (30.24)	14.69(22.54)	09.13(17.59)	11.19(19.54)	18.40(25.40)		
33	CoLk94184	2.32	MS	29.91 (33.15)	25.68 (30.45)	14.14(22.09)	08.86(17.32)	10.83(19.21)	18.19(25.25)		
34	CoSe 16453	3.76	S	26.84(31.20)	21.19(27.41)	21.05(27.31)	12.46(20.67)	16.62(24.06)	25.03 (30.02)		
35	CoLk 16467	2.79	MS	29.06(32.62)	24.51 (29.67)	15.65 (23.30)	09.37(17.82)	11.72(20.02)	20.05 (26.60)		
26	CoV 92102	1.00	c	1(12)(22)(7)	10.04/10.00	26 47 (27 15)	10.00 (05.00)	20 52 (22 54)	27.00 (27.52)		
50	(Check)	4.00	5	16.12(23.67)	10.24 (18.66)	30.4/(37.15)	19.20(25.99)	30.52(33.54)	37.09(37.52)		
	SEm(±)			1.38	1.21	0.50	0.39	0.51	0.72		
	CD (5%)			3.91	3.43	1.43	1.11	1.44	2.04		
	CV			7.50	7.42	7.16	9.24	9.71	8.49		
R	-Resistant, MR-M	Aoderately	Resistar	nt, MS- Moderat	tely Susceptible,	S- Susceptible,	H- Healthy, D-	- Disease, Red ⁿ -	Reduction		

Table 2: Extent of losses in cane germination and settling mortality due to Fusarium sacchari.

remaining genotypes exhibited varying levels of susceptibility. The results were as comparable to the findings of Chhabra *et al.*, 2012, Minnatullah *et al.*, 2016, Kishore Varma *et al.*, 2020 and Dubey *et al.*, 2020. Out of thirty varieties tested against *Fusarium sacchari*, 20.69% were resistant, 51.72% were moderately resistant, 17.24% were moderately susceptible, and 10.34% were susceptible (Aaradhna and Minnatullah, 2024).

Assessment of Quantitative and Qualitative charcateristics of sugarcane varieties affected by

wilt disease induced by Fusarium sacchari

The germination data revealed in Table 2 showed clear differences based on disease resistance. In healthy plots, resistant varieties had germination rates from 40.86% to 37.79%, moderately resistant varieties ranged from 35.48% to 32.23%, moderately susceptible varieties from 30.86% to 28.74%, and susceptible varieties from 28.12% to 26.84%. The check variety, CoV 92102, had a lower count of 16.12%. In diseased plots, resistant varieties ranged from 39.35% to 35.92%, moderately

Arieties Note ing H D Ref D <thd< th=""> D <thd< th=""> D</thd<></thd<>	G		Disaasa	Rot	Ca	no Hoight	(cm)	Ca	no Cirth ((m)	Cono Woight (Iza)		
inscription openation inscription D Red inscription D Red Inscription D Red 1 CoP 19438 2441 MS 16354 141.3 1655 365 28.4 22.19 0.66 0.50 242.4 2 CoP 19438 2441 MS 178.65 151.09 154.2 38.4 3.06 20.31 0.71 0.55 21.12 3 CoP 19436 0.44 R 227.32 214.82 0.656 6.91 6.69 0.61 0.318 1.29 1.23 0.46.65 4 CoP 19449 1.54 MR 20.47 202.13 0.831 5.72 5.12 10.43 0.92 0.82 10.86 6 CoBIn 17501 3.42 S 15.12 119.66 22.85 2.95 2.16 2.677 0.66 0.44 3.16 12 CoO238 3.54 S 15.53 1.12 2.13 3.34	D.	Varieties	Score	ing			(CIII) Dodu	U U		Dodu			Dodn
$ \begin{array}{c} 1 \\ Cor 19437 \\ 2 \\ Cor 19438 \\ 2.41 \\ MS \\ 17866 \\ 15109 \\ 1542 \\ 1542 \\ 15728 \\ 1435 \\ 1435 \\ 1435 \\ 1435 \\ 1435 \\ 1435 \\ 1435 \\ 1435 \\ 1435 \\ 1435 \\ 1435 \\ 1435 \\ 1435 \\ 1438 \\ 1791 \\ 0.75 \\ 0.61 \\ 1842 \\ 123 \\ $	110.	C-D10427	Score	mg Mg	H	D	16.55	H		Keu ²	n	D	Keur
2 Cor 19438 241 MS 1860 151.09 154.2 3.84 3.06 20.31 0.11 0.25 21.12 3 Cor 19440 2.28 MS 184.35 157.88 14.33 33.88 17.91 0.75 0.61 18.66 4 CoP 0436 0.225 MS 183.27 156.65 14.52 3.99 3.26 18.29 0.74 0.60 18.91 6 CoP 19441 1.36 MR 220.47 202.13 08.31 5.72 5.12 10.43 0.92 0.82 10.86 7 CoBIn 7501 3.42 S 155.12 119.66 22.85 2.95 2.16 2.677 0.6 0.41 3.16 10 CoBIn 17501 2.43 S 155.12 119.66 22.85 2.95 2.16 2.677 0.6 0.41 3.265 12 CoC038 3.54 S 155.634 1.72 2.17 2.17	1	CoP 19437	2.84	MS	169.34	141.3	16.55	3.65	2.84	22.19	0.66	0.50	24.24
3 Cor 19440 2.28 MS 184.55 157.88 14.35 4.13 5.38 17.91 0.79 0.61 18.66 4 Cor 19436 0.44 R 227.32 214.82 0.56.65 6.69 0.318 1.29 1.23 0.465 5 Cor 0.6436 2.25 MS 18327 156.65 14.52 3.99 3.26 18.29 0.74 0.60 18.91 6 Cor 19449 1.54 MR 218.73 199.18 0.893 5.12 10.43 0.92 0.82 10.86 8 CoBin 7501 3.42 S 157.12 11.266 2.88 2.95 2.16 2.677 0.6 0.43 3.277 10 CoBin 19501 2.93 MS 167.69 139.64 16.72 3.63 2.82 2.256 0.66 0.49 2.575 12 CoO238 3.54 S 156.34 12.17 22.15 3.14 2.33	2	CoP 19438	2.41	MS	178.65	151.09	15.42	3.84	3.06	20.31	0.71	0.55	21.12
4 CoP 19436 0.44 R 227.52 214.82 05.65 6.69 6.699 0.518 1.29 1.25 00.46s 5 CoP 06436 2.25 MS 18327 155.66 14.52 399 3.26 18.29 0.74 0.08 18.49 6 CoP 19459 1.54 MR 21.87 199.18 08.31 5.7.12 10.43 0.92 0.82 0.82 13.63 7 CoBIn 17501 3.42 S 157.21 12.367 21.33 3.34 2.5 25.14 0.62 0.45 27.41 10 CoBIn 17501 3.42 S 156.34 121.7 2.215 3.14 2.33 25.79 0.61 0.43 2.950 12 Co0238 3.54 S 156.34 121.7 22.15 3.14 2.33 25.79 0.61 0.43 2.950 13 CoP20440 2.20 MS 185.84 19.47 14.17	3	CoP 19440	2.28	MS	184.35	157.88	14.35	4.13	3.38	17.91	0.75	0.61	18.66
S CoPU6436 2.25 MS 183.21 196.65 3.26 18.29 0.74 0.00 18.91 6 CoP19441 1.36 MR 220.7 202.13 0831 5.72 5.12 10.43 0.92 0.82 10.86 8 CoBIn 20501 3.48 S 153.36 117.93 3.324 2.68 1.94 27.61 0.58 0.39 3.275 9 CoBIn 17502 3.61 S 157.21 123.67 21.33 3.34 2.5 25.14 0.62 0.44 3.16 10 CoBIn 17502 3.61 S 155.12 119.66 22.85 2.95 2.16 2.677 0.6 0.41 3.16 13 CoP238 3.54 S 156.34 121.7 2.215 3.14 2.33 2579 0.61 0.43 2.950 15 CoSe 18451 2.64 MS 174.72 147.05 15.83 3.76 2.96	4	CoP 19436	0.44	R	227.32	214.82	05.63	6.91	6.69	03.18	1.29	1.23	04.65
6 CoP 19459 1.54 MR 218.7 199.18 08.93 5.13 4.49 1247 0.88 0.76 13.65 7 COP 19441 1.36 MR 220.47 202.13 08.31 5.72 5.12 10.43 0.92 0.82 10.86 9 CoBIn 17501 3.42 S 157.21 123.67 21.33 3.34 2.5 25.14 0.62 0.45 27.41 10 CoBIn 17501 3.42 S 155.12 11966 22.82 2.95 2.16 2.66 0.441 31.66 11 CoBIn 19501 2.93 MS 167.69 13.964 16.72 3.63 2.82 22.56 0.66 0.441 31.66 13 CoP20440 2.20 MS 185.84 15.79 9.161 0.433 29.50 0.66 0.84 1.02 0.95 0.638 14 BO 153 1.28 MR 22.372 20.73 0.71	5	CoP06436	2.25	MS	183.27	156.65	14.52	3.99	3.26	18.29	0.74	0.60	18.91
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	6	CoP 19459	1.54	MR	218.73	199.18	08.93	5.13	4.49	12.47	0.88	0.76	13.63
8 Cobin 20501 3.68 S 157.21 123.67 21.33 3.34 2.5 25.14 0.68 0.39 32.75 9 CoBin 17501 3.64 S 157.21 123.67 21.33 3.34 2.5 25.14 0.66 0.44 31.66 11 CoBin 17502 3.61 S 155.12 119.66 22.85 2.95 2.16 26.77 0.66 0.44 25.75 12 CoO238 3.54 S 156.34 121.7 22.15 3.14 2.33 2.79 0.61 0.43 29.50 13 CoP20440 2.20 MS 185.84 159.49 1.41.7 1.41.73 1.47.05 15.83 3.76 2.96 2.127 0.60 0.62 18.42 14 BO 153 1.28 MR 22.37 205.08 07.83 6.16 5.63 0.86 0.98 0.918 21.57 0.67 0.51 2.237 16	7	CoP 19441	1.36	MR	220.47	202.13	08.31	5.72	5.12	10.43	0.92	0.82	10.86
9 Coblin 17501 3.42 S 157.12 123.67 21.33 3.34 2.5 25.14 0.62 0.43 27.41 10 CoBlin 17501 2.93 MS 157.12 119.66 22.85 2.95 2.16 25.77 0.66 0.44 31.66 11 CoBlin 19501 2.93 MS 157.64 121.7 22.15 3.63 2.82 22.56 0.66 0.49 25.75 12 Co0238 3.54 S 155.34 121.7 22.15 3.14 2.33 25.79 0.61 0.43 29.50 13 CoP20440 2.20 MS 174.72 147.05 15.83 3.76 2.96 21.27 0.69 0.53 23.10 16 CoL20466 2.56 MS 176.86 149.13 15.67 3.81 3.02 20.73 0.71 0.55 22.33 17 CoP20436 1.38 MR 219.36 0.636 0.88	8	CoBln 20501	3.68	S	153.65	117.93	23.24	2.68	1.94	27.61	0.58	0.39	32.75
10 Coblin 17502 3.61 S 15:12 119:66 22:85 2.95 2.16 26.77 0.66 0.41 31.66 11 CoBin 19501 2.93 MS 167:69 139:64 167:72 3.63 2.82 22:56 0.66 0.49 25:75 12 CoO238 3.54 S 156:34 121.7 22:15 3.14 2.33 25:79 0.61 0.43 29:50 13 CoP20440 2.20 MS 185:84 159:49 14.17 4.18 3.47 17:22 0.76 0.62 18:42 14 B0153 1.28 MR 223.76 207.54 07:24 6.46 60:2 0.68 1.02 0.95 0.638 15 CoSe18451 2.26 MS 176.86 147.05 15.83 3.76 2.96 21.27 0.69 0.53 23.10 16 CoLx20466 1.20 MR 212.52 205.08 07.83 6.16 5.63 08.6 0.98 0.99 0.83 12.35 12.35	9	CoBln 17501	3.42	S	157.21	123.67	21.33	3.34	2.5	25.14	0.62	0.45	27.41
11 CoBIn 19501 2.93 MS 167.69 139.64 16.72 3.63 2.82 22.56 0.66 0.49 25.75 12 CoO238 3.54 S 156.34 121.7 22.15 3.14 2.33 25.79 0.61 0.43 29.50 13 CoP 20440 2.20 MS 185.84 159.49 14.17 4.18 3.47 17.22 0.66 0.43 29.50 14 BO 153 1.28 MR 223.76 207.54 07.24 6.46 6.02 0.681 1.02 0.95 0.686 15 CoSe 18451 2.64 MS 174.72 147.05 15.83 3.76 2.96 21.27 0.69 0.53 23.10 16 CoL 20436 1.20 MR 22.52 205.08 07.83 6.16 5.63 0.86 0.98 0.89 0.18 18 CoP 20437 2.74 MS 171.23 143.43 1623 3.69 2.88 21.95 0.67 0.51 23.88 20	10	CoBln 17502	3.61	S	155.12	119.66	22.85	2.95	2.16	26.77	0.6	0.41	31.66
12 Co 0238 3.54 S 156.34 121.7 22.15 3.14 2.33 25.79 0.61 0.43 29.50 13 CoP 20440 2.20 MS 185.84 159.49 14.17 4.18 3.47 17.22 0.61 0.62 184.2 14 B0 153 1.28 MR 223.76 207.54 0.72.4 6.46 6.02 0.681 1.02 0.95 0.686 15 CoSe 18451 2.64 MS 174.72 147.05 15.83 3.76 2.96 21.27 0.69 0.53 23.10 16 CoL20436 1.20 MR 222.52 205.08 07.83 6.16 5.63 086 0.98 0.78 12.35 19 CoP20437 2.74 MS 171.23 143.43 1623 3.69 2.88 21.95 0.67 0.51 23.88 20 CoS18452 2.38 MS 181.47 153.95 15.15	11	CoBln 19501	2.93	MS	167.69	139.64	16.72	3.63	2.82	22.56	0.66	0.49	25.75
13 CoP 20440 2.20 MS 1185.84 159.49 14.17 4.18 3.47 17.22 0.76 0.62 1842 14 BO 153 1.28 MR 223.76 207.54 07.24 6.46 6.02 0.681 1.02 0.95 0.686 15 CoSe 18451 2.64 MS 174.72 147.05 15.83 3.76 2.96 0.73 0.71 0.55 22.53 16 CoLk 20466 2.56 MS 176.86 149.13 15.67 3.81 3.02 20.73 0.71 0.55 22.53 17 CoP 20436 1.20 MR 22.52 205.08 07.83 6.16 5.63 0.86 0.98 0.89 0.918 18 CoP 20437 2.74 MS 171.23 143.43 16.23 3.69 2.88 21.95 0.67 0.51 23.88 20 CoSe 18452 2.38 MS 181.7 153.3 3.69 2.88 11.92 0.64 21 CoP 20439 0.67 R	12	Co0238	3.54	S	156.34	121.7	22.15	3.14	2.33	25.79	0.61	0.43	29.50
14 BO 153 1.28 MR 223.76 207.54 07.24 6.46 6.02 06.81 1.02 0.95 06.86 15 CoSe 18451 2.64 MS 174.72 147.05 15.83 3.76 2.96 21.27 0.69 0.53 23.10 16 CoLk 20466 1.20 MR 222.52 205.08 07.83 6.16 5.63 0.86 0.98 0.89 09.18 18 CoP 20438 1.38 MR 219.36 200.39 08.64 5.46 4.81 11.9 0.89 0.78 12.35 19 CoP 20437 2.74 MS 171.23 143.43 1623 3.69 2.88 21.95 0.67 0.51 23.88 20 CoSe 18452 2.38 MS 181.47 153.96 15.15 3.92 3.17 19.13 0.73 0.58 20.54 21 CoP 20439 0.67 R 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23	13	CoP 20440	2.20	MS	185.84	159.49	14.17	4.18	3.47	17.22	0.76	0.62	18.42
15 CoSe 18451 2.64 MS 174.72 147.05 15.83 3.76 2.96 21.27 0.69 0.53 23.10 16 CoLk 20466 2.56 MS 176.86 149.13 15.67 3.81 3.02 20.73 0.71 0.55 22.53 17 CoP 20436 1.20 MR 222.52 205.08 07.83 6.16 5.63 08.6 0.98 0.89 09.18 18 CoP 20437 2.74 MS 171.23 143.43 1623 3.69 2.88 21.95 0.67 0.51 23.88 20 CoSe 18452 2.38 MS 181.47 153.96 15.15 3.92 3.17 19.13 0.73 0.58 20.54 21 CoP 20439 0.67 R 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23 CoLk 20468 1.74 MR 216.45 195.83 09.52 4.36 3.98 14.22 0.85 0.73 14.11 25 <td>14</td> <td>BO 153</td> <td>1.28</td> <td>MR</td> <td>223.76</td> <td>207.54</td> <td>07.24</td> <td>6.46</td> <td>6.02</td> <td>06.81</td> <td>1.02</td> <td>0.95</td> <td>06.86</td>	14	BO 153	1.28	MR	223.76	207.54	07.24	6.46	6.02	06.81	1.02	0.95	06.86
16 Colk 20466 2.56 MS 176.86 149.13 15.67 3.81 3.02 20.73 0.71 0.55 22.53 17 CoP 20436 1.20 MR 222.52 205.08 07.83 6.16 5.63 08.6 0.98 0.98 0.918 18 CoP 20437 1.74 MS 171.23 143.43 16.23 3.69 2.88 21.95 0.67 0.51 23.88 20 CoSe 18452 2.38 MS 181.47 153.96 15.15 3.92 3.17 19.13 0.73 0.58 20.54 21 CoP 20439 0.67 R 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23 CoLk 20469 1.23 MR 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23 CoLk 20468 1.74 MR 224.65 211.82 06.43 3.98 14.22 0.85 0.73 14.11 25 CoP 22	15	CoSe 18451	2.64	MS	174.72	147.05	15.83	3.76	2.96	21.27	0.69	0.53	23.10
17 CoP 20436 1.20 MR 222.52 205.08 07.83 6.16 5.63 08.6 0.98 0.98 0.918 18 CoP 20438 1.38 MR 219.36 200.39 08.64 5.66 4.81 11.9 0.89 0.78 12.35 19 CoP 20437 2.74 MS 171.23 143.43 16.23 3.69 2.88 21.95 0.67 0.51 23.88 20 CoSe 18452 2.38 MS 181.47 153.96 15.15 3.92 3.17 191.3 0.73 0.58 20.54 21 CoP 20439 0.67 R 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23 CoLk 20469 1.23 MR 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23 CoLk 20468 1.74 MR 21.65 08.39 09.52 4.36 3.98 14.22 0.85 0.73 14.11 25	16	CoLk 20466	2.56	MS	176.86	149.13	15.67	3.81	3.02	20.73	0.71	0.55	22.53
18 CoP 20438 1.38 MR 219.36 200.39 08.64 5.46 4.81 11.9 0.89 0.78 12.35 19 CoP 20437 2.74 MS 171.23 143.43 1623 3.69 2.88 21.95 0.67 0.51 23.88 20 CoSe 18452 2.38 MS 181.47 153.96 15.15 3.92 3.17 19.13 0.73 0.58 20.54 21 CoP 20439 0.67 R 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23 CoLk 20469 1.23 MR 224.12 208.39 07.01 6.52 6.12 06.13 1.05 0.98 06.66 24 CoLk 20468 1.74 MR 216.45 195.83 09.52 4.36 3.98 14.22 0.85 0.73 14.11 25 CoP 22436 0.48 R 226.63 213.45 05.81 <td>17</td> <td>CoP 20436</td> <td>1.20</td> <td>MR</td> <td>222.52</td> <td>205.08</td> <td>07.83</td> <td>6.16</td> <td>5.63</td> <td>08.6</td> <td>0.98</td> <td>0.89</td> <td>09.18</td>	17	CoP 20436	1.20	MR	222.52	205.08	07.83	6.16	5.63	08.6	0.98	0.89	09.18
19 CoP 20437 2.74 MS 171.23 143.43 16.23 3.69 2.88 21.95 0.67 0.51 23.88 20 CoSe 18452 2.38 MS 181.47 153.96 15.15 3.92 3.17 19.13 0.73 0.58 20.54 21 CoP 9301 0.38 R 229.05 216.87 05.31 7.04 6.85 02.69 1.35 1.29 04.44 22 CoP 20439 0.67 R 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23 CoLk 20468 1.74 MR 221.65 195.83 09.52 4.36 3.98 14.22 0.85 0.73 14.11 25 CoP 22436 0.48 R 226.63 213.45 05.81 6.86 6.58 04.08 1.25 1.19 04.80 27 CoP 22438 1.30 MR 221.65 203.63 08.12 5.93 5.36 09.61 0.96 0.87 09.37 28	18	CoP 20438	1.38	MR	219.36	200.39	08.64	5.46	4.81	11.9	0.89	0.78	12.35
20 CoSe 18452 2.38 MS 181.47 153.96 15.15 3.92 3.17 19.13 0.73 0.58 20.54 21 CoP90439 0.67 R 229.05 216.87 05.31 7.04 6.85 02.69 1.35 1.29 04.44 22 CoP20439 0.67 R 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23 CoLk 20469 1.23 MR 224.12 208.39 07.01 6.52 6.12 06.13 1.05 0.98 06.66 24 CoLk 20468 1.74 MR 216.45 195.83 09.52 4.36 3.98 14.22 0.85 0.73 14.11 25 CoP22439 0.62 R 225.45 211.82 05.81 6.86 6.58 04.08 1.25 1.19 04.80 27 CoP22438 1.30 MR 221.65 203.63 08.12 5.93 5.36 09.61 0.96 0.87 09.37 28	19	CoP 20437	2.74	MS	171.23	143.43	16.23	3.69	2.88	21.95	0.67	0.51	23.88
21 CoP 9301 0.38 R 229.05 216.87 05.31 7.04 6.85 02.69 1.35 1.29 04.44 22 CoP 20439 0.67 R 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23 CoLk 20469 1.23 MR 224.12 208.39 07.01 6.52 6.12 06.13 1.05 0.98 06.66 24 CoLk 20468 1.74 MR 216.45 195.83 09.52 4.36 3.98 14.22 0.85 0.73 14.11 25 CoP 22439 0.62 R 225.45 211.82 06.04 6.81 6.47 04.99 1.17 1.11 05.12 26 CoP 22436 0.48 R 226.63 213.45 05.81 6.86 6.58 04.08 1.25 1.19 04.80 27 CoP 22433 1.67 MR 217.81 197.65 09.25 4.87 4.22 13.34 0.86 0.74 13.95 29	20	CoSe 18452	2.38	MS	181.47	153.96	15.15	3.92	3.17	19.13	0.73	0.58	20.54
22 CoP 20439 0.67 R 224.72 210.48 06.33 6.75 6.38 05.48 1.12 1.08 05.35 23 CoLk 20469 1.23 MR 224.12 208.39 07.01 6.52 6.12 06.13 1.05 0.98 06.66 24 CoLk 20468 1.74 MR 216.45 195.83 09.52 4.36 3.98 14.22 0.85 0.73 14.11 25 CoP 22439 0.62 R 225.45 211.82 06.04 6.81 6.47 04.99 1.17 1.11 05.12 26 CoP 22436 0.48 R 226.63 213.45 05.81 6.86 6.58 04.08 1.25 1.19 04.80 27 CoP 22437 1.67 MR 217.81 197.65 09.25 4.87 4.22 13.34 0.86 0.74 13.95 29 CoP 22440 0.91 R 224.46 209.83 06.51 6.68 6.31 05.53 1.08 1.02 05.55 30	21	CoP 9301	0.38	R	229.05	216.87	05.31	7.04	6.85	02.69	1.35	1.29	04.44
23 CoLk 20469 1.23 MR 224.12 208.39 07.01 6.52 6.12 06.13 1.05 0.98 06.66 24 CoLk 20468 1.74 MR 216.45 195.83 09.52 4.36 3.98 14.22 0.85 0.73 14.11 25 CoP 22439 0.62 R 225.45 211.82 06.04 6.81 6.47 04.99 1.17 1.11 05.12 26 CoP 22436 0.48 R 226.63 213.45 05.81 6.86 6.58 04.08 1.25 1.19 04.80 27 CoP 22438 1.30 MR 221.65 203.63 08.12 5.93 5.36 09.61 0.96 0.87 09.37 28 CoP 22437 1.67 MR 217.81 197.65 09.25 4.87 4.22 13.34 0.86 0.74 13.95 29 CoP 22440 0.91 R 224.46 209.83 06.51 6.68 6.31 05.53 1.08 1.02 05.55 30	22	CoP 20439	0.67	R	224.72	210.48	06.33	6.75	6.38	05.48	1.12	1.08	05.35
24 CoLk 20468 1.74 MR 216.45 195.83 09.52 4.36 3.98 14.22 0.85 0.73 14.11 25 CoP 22439 0.62 R 225.45 211.82 06.04 6.81 6.47 04.99 1.17 1.11 05.12 26 CoP 22436 0.48 R 226.63 213.45 05.81 6.86 6.58 04.08 1.25 1.19 04.80 27 CoP 22438 1.30 MR 221.65 203.63 08.12 5.93 5.36 09.61 0.96 0.87 09.37 28 CoP 22437 1.67 MR 217.81 197.65 09.25 4.87 4.22 13.34 0.86 0.74 13.95 29 CoP 22440 0.91 R 224.46 209.83 06.51 6.68 6.31 05.53 1.08 1.02 05.55 30 CoP 22442 1.25 MR 223.34 206.46 07.55 6.34 5.86 07.57 1.01 0.93 07.92 31	23	CoLk 20469	1.23	MR	224.12	208.39	07.01	6.52	6.12	06.13	1.05	0.98	06.66
25 CoP 22439 0.62 R 225.45 211.82 06.04 6.81 6.47 04.99 1.17 1.11 05.12 26 CoP 22436 0.48 R 226.63 213.45 05.81 6.86 6.58 04.08 1.25 1.19 04.80 27 CoP 22438 1.30 MR 221.65 203.63 08.12 5.93 5.36 09.61 0.96 0.87 09.37 28 CoP 22437 1.67 MR 217.81 197.65 09.25 4.87 4.22 13.34 0.86 0.74 13.95 29 CoP 22440 0.91 R 224.46 209.83 06.51 6.68 6.31 05.53 1.08 1.02 05.55 30 CoP 22442 1.25 MR 223.34 206.46 07.55 6.34 5.86 07.57 1.01 0.93 07.92 31 CoP 22441 0.40 R 228.54 215.82 15.33 3.87 3.11 19.63 0.72 0.57 20.83 32	24	CoLk 20468	1.74	MR	216.45	195.83	09.52	4.36	3.98	14.22	0.85	0.73	14.11
26 CoP 22436 0.48 R 226.63 213.45 05.81 6.86 6.58 04.08 1.25 1.19 04.80 27 CoP 22438 1.30 MR 221.65 203.63 08.12 5.93 5.36 09.61 0.96 0.87 09.37 28 CoP 22437 1.67 MR 217.81 197.65 09.25 4.87 4.22 13.34 0.86 0.74 13.95 29 CoP 22440 0.91 R 224.46 209.83 06.51 6.68 6.31 05.53 1.08 1.02 05.55 30 CoP 22442 1.25 MR 223.34 206.46 07.55 6.34 5.86 07.57 1.01 0.93 07.92 31 CoP 22441 0.40 R 228.54 215.82 05.56 6.97 6.77 02.86 1.33 1.27 0.451 32 CoP 18436 2.46 MS 179.32 151.82 15.33 3.87 3.11 19.63 0.72 0.57 20.83 33	25	CoP 22439	0.62	R	225.45	211.82	06.04	6.81	6.47	04.99	1.17	1.11	05.12
27 CoP 22438 1.30 MR 221.65 203.63 08.12 5.93 5.36 09.61 0.96 0.87 09.37 28 CoP 22437 1.67 MR 217.81 197.65 09.25 4.87 4.22 13.34 0.86 0.74 13.95 29 CoP 22440 0.91 R 224.46 209.83 06.51 6.68 6.31 05.53 1.08 1.02 05.55 30 CoP 22442 1.25 MR 223.34 206.46 07.55 6.34 5.86 07.57 1.01 0.93 07.92 31 CoP 22441 0.40 R 228.54 215.82 05.56 6.97 6.77 02.86 1.33 1.27 04.51 32 CoP 18436 2.46 MS 179.32 151.82 15.33 3.87 3.11 19.63 0.72 0.57 20.83 33 CoLk 94184 2.32 MS 182.68 155.61 14.81 3.95 3.21 18.73 0.74 0.59 20.27 34	26	CoP 22436	0.48	R	226.63	213.45	05.81	6.86	6.58	04.08	1.25	1.19	04.80
28 CoP 22437 1.67 MR 217.81 197.65 09.25 4.87 4.22 13.34 0.86 0.74 13.95 29 CoP 22440 0.91 R 224.46 209.83 06.51 6.68 6.31 05.53 1.08 1.02 05.55 30 CoP 22442 1.25 MR 223.34 206.46 07.55 6.34 5.86 07.57 1.01 0.93 07.92 31 CoP 22441 0.40 R 228.54 215.82 05.56 6.97 6.77 02.86 1.33 1.27 04.51 32 CoP 18436 2.46 MS 179.32 151.82 15.33 3.87 3.11 19.63 0.72 0.57 20.83 33 CoLk 94184 2.32 MS 182.68 155.61 14.81 3.95 3.21 18.73 0.74 0.59 20.27 34 CoSe 16453 3.76 S 151.43 115.27 23.87 2.23 1.60 28.25 0.58 0.38 34.48 35	27	CoP 22438	1.30	MR	221.65	203.63	08.12	5.93	5.36	09.61	0.96	0.87	09.37
29 CoP 22440 0.91 R 224.46 209.83 06.51 6.68 6.31 05.53 1.08 1.02 05.55 30 CoP 22442 1.25 MR 223.34 206.46 07.55 6.34 5.86 07.57 1.01 0.93 07.92 31 CoP 22441 0.40 R 228.54 215.82 05.56 6.97 6.77 02.86 1.33 1.27 04.51 32 CoP 18436 2.46 MS 179.32 151.82 15.33 3.87 3.11 19.63 0.72 0.57 20.83 33 CoLk 94184 2.32 MS 182.68 155.61 14.81 3.95 3.21 18.73 0.74 0.59 20.27 34 CoSe 16453 3.76 S 151.43 115.27 23.87 2.23 1.60 28.25 0.58 0.38 34.48 35 CoLk 16467 2.79 MS 173.54 145.90 15.92 3.73 2.92 21.71 0.68 0.52 23.52 36 <td>28</td> <td>CoP 22437</td> <td>1.67</td> <td>MR</td> <td>217.81</td> <td>197.65</td> <td>09.25</td> <td>4.87</td> <td>4.22</td> <td>13.34</td> <td>0.86</td> <td>0.74</td> <td>13.95</td>	28	CoP 22437	1.67	MR	217.81	197.65	09.25	4.87	4.22	13.34	0.86	0.74	13.95
30 CoP 22442 1.25 MR 223.34 206.46 07.55 6.34 5.86 07.57 1.01 0.93 07.92 31 CoP 22441 0.40 R 228.54 215.82 05.56 6.97 6.77 02.86 1.33 1.27 04.51 32 CoP 18436 2.46 MS 179.32 151.82 15.33 3.87 3.11 19.63 0.72 0.57 20.83 33 CoLk 94184 2.32 MS 182.68 155.61 14.81 3.95 3.21 18.73 0.74 0.59 20.27 34 CoSe 16453 3.76 S 151.43 115.27 23.87 2.23 1.60 28.25 0.58 0.38 34.48 35 CoLk 16467 2.79 MS 173.54 145.90 15.92 3.73 2.92 21.71 0.68 0.52 23.52 36 CoV 92102 (Check) 4.00 S 136.27 97.25 28.63 1.9 1.17 38.67 0.54 0.31 42.59	29	CoP 22440	0.91	R	224.46	209.83	06.51	6.68	6.31	05.53	1.08	1.02	05.55
31 CoP 22441 0.40 R 228.54 215.82 05.56 6.97 6.77 02.86 1.33 1.27 04.51 32 CoP 18436 2.46 MS 179.32 151.82 15.33 3.87 3.11 19.63 0.72 0.57 20.83 33 CoLk 94184 2.32 MS 182.68 155.61 14.81 3.95 3.21 18.73 0.74 0.59 20.27 34 CoSe 16453 3.76 S 151.43 115.27 23.87 2.23 1.60 28.25 0.58 0.38 34.48 35 CoLk 16467 2.79 MS 173.54 145.90 15.92 3.73 2.92 21.71 0.68 0.52 23.52 36 CoV 92102 (Check) 4.00 S 136.27 97.25 28.63 1.9 1.17 38.67 0.54 0.31 42.59 36 CD(5%) 9.07 7.84 0.60 0.22 0.19 0.70 0.04 0.03 0.83 37 CD(5%) 25.58 <td>30</td> <td>CoP 22442</td> <td>1.25</td> <td>MR</td> <td>223.34</td> <td>206.46</td> <td>07.55</td> <td>6.34</td> <td>5.86</td> <td>07.57</td> <td>1.01</td> <td>0.93</td> <td>07.92</td>	30	CoP 22442	1.25	MR	223.34	206.46	07.55	6.34	5.86	07.57	1.01	0.93	07.92
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	31	CoP 22441	0.40	R	228.54	215.82	05.56	6.97	6.77	02.86	1.33	1.27	04.51
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	32	CoP 18436	2.46	MS	179.32	151.82	15.33	3.87	3.11	19.63	0.72	0.57	20.83
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	33	CoLk 94184	2.32	MS	182.68	155.61	14.81	3.95	3.21	18.73	0.74	0.59	20.27
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	34	CoSe 16453	3.76	S	151.43	115.27	23.87	2.23	1.60	28.25	0.58	0.38	34.48
36 CoV 92102 (Check) 4.00 S 136.27 97.25 28.63 1.9 1.17 38.67 0.54 0.31 42.59 SEm(±) 9.07 7.84 0.60 0.22 0.19 0.70 0.04 0.03 0.83 CD (5%) 25.58 22.12 1.71 0.63 0.54 1.98 0.11 0.11 2.36 CV 8.06 7.93 8.14 8.22 8.05 7.78 8.50 9.34 8.42	35	CoLk 16467	2.79	MS	173.54	145.90	15.92	3.73	2.92	21.71	0.68	0.52	23.52
SEm(±) 9.07 7.84 0.60 0.22 0.19 0.70 0.04 0.03 0.83 CD (5%) 25.58 22.12 1.71 0.63 0.54 1.98 0.11 0.11 2.36 CV 8.06 7.93 8.14 8.22 8.05 7.78 8.50 9.34 8.42	36	CoV92102 (Check)	4.00	S	136.27	97.25	28.63	1.9	1.17	38.67	0.54	0.31	42.59
CD (5%) 25.58 22.12 1.71 0.63 0.54 1.98 0.11 0.11 2.36 CV 8.06 7.93 8.14 8.22 8.05 7.78 8.50 9.34 8.42		SEm(+)			9.07	7.8/	0.60	0.22	0.19	0.70	0.04	0.03	0.83
CV 25.56 22.12 1.71 0.05 0.54 1.56 0.11 0.11 2.30 CV 8.06 7.93 8.14 8.22 8.05 7.78 8.50 9.34 8.42		CD(5%)			25.58	22.12	1 71	0.22	0.19	1.08	0.04	0.05	2.05
Cy 0.00 7.35 0.14 0.22 0.00 7.16 8.30 9.34 8.42	<u> </u>	CD(370)			20.00	7.03	1 ./1 Q 1/	8 m	8.05	7.79	8.50	0.11	2.50
						1.93	0.14	0.22	0.00	/./0	0.00	<u>7.34</u>	<u>,</u> .

Table 3: Extent of losses on various quantitative cane parameters due to Fusarium sacchari.

resistant from 32.96% to 29.37%, moderately susceptible from 26.67% to 23.97%, and susceptible from 22.65% to 21.19%, with CoV 92102 at 10.24%. Germination reductions were smallest for resistant varieties (3.68%-4.94%) and largest for susceptible ones (19.45%-21.05%), with CoV 92102 showing the highest reduction (36.47%).

The settling mortality percentage data depicted in table show significant variation among sugarcane varieties based on disease resistance. In healthy plots, resistant varieties had the lowest mortality (3.12% to 3.67%),

moderately resistant varieties ranged from 4.25% to 6.86%, moderately susceptible varieties from 7.94% to 9.45%, and susceptible varieties from 9.62% to 12.46%. The check variety, CoV 92102, had the highest mortality at 19.20%. In diseased plots, resistant varieties had mortality rates from 3.25% to 3.92%, moderately resistant from 4.56% to 7.75%, moderately susceptible from 9.34% to 12.16%, and susceptible varieties from 12.51% to 16.62%. CoV 92102 had the highest mortality at 30.52%. Mortality reductions were smallest for resistant varieties

(4.00% to 6.37%) and largest for susceptible ones (23.10% to 25.03%), with CoV 92102 showing the highest reduction (37.09%).

The data on cane length, girth, and weight, depicted in Table 3, reveal substantial differences due to wilt disease. The cane length data show significant differences based on disease resistance. In healthy plots, resistant varieties had cane lengths ranging from 229.05 cm (CoP 9301) to 224.46 cm (CoP 22440). Moderately resistant varieties ranged from 224.12 cm to 216.45 cm, moderately susceptible from 185.84 cm to 167.69 cm, and susceptible varieties from 157.21 cm to 151.43 cm. The check variety, CoV 92102, had a length of 136.27 cm. In diseased plots, cane lengths for resistant varieties ranged from 216.87 cm to 209.83 cm, moderately resistant from 208.39 cm to 195.83 cm, moderately susceptible from 159.49 cm to 139.64 cm, and susceptible from 123.67 cm to 115.27 cm, with CoV 92102 measuring 97.25 cm. Percentage reductions in cane length were 5.31%-6.51% for resistant varieties, 7.01%-9.52% for moderately resistant, 14.17%-16.72% for moderately susceptible, and 21.33%-23.87% for susceptible varieties. CoV 92102 showed the highest reduction at 28.63%.

The cane girth data show variations based on disease resistance. In healthy plots, resistant varieties had girths from 7.04 cm (CoP 9301) to 6.68 cm (CoP 22440), moderately resistant ranged from 6.52 cm to 4.36 cm, moderately susceptible from 4.18 cm to 3.63 cm, and susceptible from 3.34 cm to 2.23 cm, with CoV 92102 at 1.90 cm. In diseased plots, resistant varieties had girths from 6.85 cm to 6.31 cm, moderately resistant from 6.12 cm to 3.98 cm, moderately susceptible from 3.47 cm to 2.82 cm, and susceptible from 2.50 cm to 1.60 cm, with CoV 92102 at 1.17 cm. Girth reductions ranged from 2.69% to 5.53% for resistant varieties, 6.13% to 14.22% for moderately resistant, 17.22% to 22.56% for moderately susceptible, and 25.14% to 28.25% for susceptible varieties, with CoV 92102 showing the highest reduction at 38.67%.

For cane weight, healthy plots of resistant varieties ranged from 1.35 kg (CoP 9301) to 1.08 kg (CoP 22440). Moderately resistant varieties ranged from 1.05 kg to 0.85 kg, moderately susceptible from 0.76 kg to 0.66 kg, and susceptible varieties from 0.62 kg to 0.58 kg, with the check variety CoV 92102 at 0.54 kg. In diseased plots, resistant varieties weighed from 1.29 kg to 1.02 kg,

S.	Variation Disease Bati		Dating	Brix (%)			Sı	icrose (%	6)	Purity (%)		
No	varieties	Score	Kaung	Н	D	Red ⁿ	H	D	Red ⁿ	Н	D	Red ⁿ
1	CoD 10/27	2.84	MS	16.13	13.90	13.82	11.15	07.84	29.68	69.12	56.41	18.38
1	COF 19437	2.04	NIS	(23.68)	(21.89)	(21.82)	(19.51)	(16.26)	(33.01)	(56.24)	(48.68)	(25.39)
2	CoP 10/38	2 /1	MS	16.82	14.84	11.77	11.63	08.73	24.93	69.14	58.82	14.92
2	COI 19438	2.41	NIS .	(24.21)	(22.66)	(20.06)	(19.94)	(17.19)	(29.95)	(56.25)	(50.08)	(22.72)
3	CoP 10440	2.78	MS	17.34	15.56	10.26	12.05	09.26	23.15	69.49	59.51	14.36
5	COF 19440	2.20	MIS	(24.61)	(23.23)	(18.68)	(20.31)	(17.72)	(28.76)	(56.47)	(50.48)	(22.27)
1	CoP 10/36	0.44	P	20.14	19.31	04.12	17.35	16.08	07.31	86.14	83.27	03.33
4	COF 19430	0.44	K	(26.67)	(26.07)	(11.71)	(24.62)	(23.64)	(15.69)	(68.14)	(65.86)	(10.51)
5	CoP06436	2.25	MS	17.26	15.44	10.54	11.96	09.24	22.74	69.29	59.84	13.63
5	COI 00450	2.23	NIS .	(24.55)	(23.14)	(18.94)	(20.23)	(17.70)	(28.48)	(56.35)	(50.67)	(21.67)
6	CoP 10/50	1.54	MR	18.74	17.49	06.67	14.87	12.84	15.53	79.35	69.99	11.46
0	COI 19439	1.34	IVIK	(25.65)	(24.72)	(14.97)	(22.68)	(21.00)	(23.21)	(62.97)	(56.78)	(19.79)
7	CoP 19441	1.36	36 MR	18.83	17.69	06.05	15.26	13.31	12.77	81.05	75.24	07.16
/				(25.72)	(24.87)	(14.24)	(22.99)	(21.40)	(20.94)	(64.19)	(60.16)	(15.52)
8	CoBln 20501	3.68	S	13.46	10.82	19.61	08.37	05.20	37.87	62.18	48.05	22.72
	C0Dill 20301	5.00	5	(21.52)	(19.20)	(26.28)	(16.82)	(13.18)	(37.98)	(52.05)	(43.88)	(28.47)
9	CoBln 17501	CoBln 17501 3.42	3.42 5	15.03	12.47	17.03	09.06	06.05	33.22	60.27	48.51	19.51
	CODIII 17501	5.42	5	(22.81)	(20.68)	(24.37)	(17.52)	(14.24)	(35.20)	(50.93)	(44.15)	(26.21)
10	CoBln 17502	3.61	S	14.15	11.53	18.51	08.54	05.48	35.83	60.35	47.52	21.25
10	CODIII 17502	5.01	5	(22.10)	(19.85)	(25.48)	(16.99)	(13.54)	(36.77)	(50.97)	(43.58)	(27.45)
11	CoBln 19501	2.93	MS	16.06	13.82	13.94	11.03	07.62	30.94	68.67	56.36	17.92
	CODII 17501	2.75	1010	(23.63)	(21.82)	(21.92)	(19.40)	(16.02)	(33.80)	(55.96)	(48.65)	(25.04)
12	Co0238	3.54	s	14.86	12.22	17.76	08.89	05.80	34.75	59.82	47.46	20.66
12	00230	5.54	5	(22.67)	(20.46)	(24.92)	(17.35)	(13.94)	(36.12)	(50.66)	(43.54)	(27.03)

Table 4: Extent of losses on various qualitative cane parameters due to Fusarium sacchari.

Continue ...

13	CoP20440	2 20	MS	17.48	15.73	10.01	12.14	09.28	23.55	69.45	58.99	15.06		
15	COI 20110	2.20	NIS .	(24.71)	(23.37)	(18.44)	(20.39)	(17.74)	(29.03)	(56.45)	(50.18)	(22.83)		
14	BO 153	1.28	MR	19.03	18.04	05.20	15.93	14.38	09.73	83.71	79.71	04.77		
17	DO 155	1.20	WIX	(25.86)	(25.13)	(13.18)	(23.52)	(22.28)	(18.18)	(66.20)	(63.23)	(12.62)		
15	CoSe 18/151	264	MS	16.53	14.46	12.52	11.47	08.54	25.54	69.38	59.05	14.88		
15	000010401	2.04	NIS .	(23.99)	(22.35)	(20.72)	(19.80)	(16.99)	(30.36)	(56.40)	(50.21)	(22.69)		
16	Col k 20466	2.56	MS	16.74	14.72	12.06	11.54	08.72	24.43	68.93	59.23	14.07		
10	COLK 20400	2.30	MIS	(24.15)	(22.56)	(20.32)	(19.86)	(17.18)	(29.62)	(56.12)	(50.32)	(22.03)		
17	CoP 20/136	1 20	MR	18.94	17.87	05.64	15.58	13.82	11.29	82.26	77.34	05.98		
17	COI 20450	1.20	WIX	(25.80)	(25.01)	(13.74)	(23.25)	(21.82)	(19.63)	(65.09)	(61.57)	(14.15)		
18	CoP 20/138	1 38	MR	18.77	17.58	06.33	15.04	13.01	13.46	80.13	74.01	07.63		
10	COI 20438	1.50	WIX	(25.67)	(24.79)	(14.57)	(22.82)	(21.14)	(21.52)	(63.53)	(59.35)	(16.04)		
10	CoP 20/137	274	MS	16.25	14.06	13.47	11.23	08.01	28.67	69.10	56.97	17.55		
19	COI 20437	2.74	NIS .	(23.77)	(22.02)	(21.53)	(19.58)	(16.44)	(32.37)	(56.23)	(49.01)	(24.77)		
20	CoSe 18452	2 38	MS	17.05	15.16	11.08	11.78	08.97	23.85	69.09	59.16	14.37		
20	0000 10402	2.30	IVIS	(24.39)	(22.91)	(19.44)	(20.07)	(17.43)	(29.23)	(56.22)	(50.28)	(22.28)		
21	CoP9301	0.38	R	20.41	19.61	03.91	17.56	16.35	06.89	86.04	83.38	03.07		
21	COI 7501	0.56	K	(26.86)	(26.28)	(11.40)	(24.77)	(23.85)	(15.22)	(68.06)	(65.94)	(10.09)		
γ	CoP 20/130	0.67	P	19.67	18.81	04.37	16.87	15.49	08.18	85.77	82.34	03.81		
	COI 20439	0.07	K	(26.33)	(25.70)	(12.07)	(24.25)	(23.18)	(16.62)	(67.84)	(65.15)	(11.26)		
23	Col k 20/69	1 23	MR	19.06	18.10	05.03	16.02	14.50	09.48	84.05	80.12	04.67		
20	COLK 20409	1.23	WIX	(25.89)	(25.18)	(12.96)	(23.59)	(22.38)	(17.93)	(66.46)	(63.52)	(12.48)		
24	Col k 20468	1 74	MR	18.57	17.28	06.94	14.53	11.85	18.44	78.25	68.57	12.37		
24	COLK 20408	1.74	WIIX	(25.53)	(24.56)	(15.27)	(22.41)	(20.14)	(25.43)	(62.20)	(55.90)	(20.59)		
25	CoP 22/30	0.62	D	19.89	19.04	04.27	17.16	15.80	07.92	86.27	82.98	03.81		
ω	COI 22439	0.02	K	(26.49)	(25.87)	(11.93)	(24.47)	(23.42)	(16.35)	(68.25)	(65.63)	(11.26)		
26	CoP22/136	0.48	P	20.03	19.20	04.14	17.28	15.97	07.58	86.27	83.18	03.58		
20	COI 22430	0.40	K	(26.59)	(25.99)	(11.74)	(24.56)	(23.55)	(15.98)	(68.25)	(65.79)	(10.91)		
27	CoP 22/138	1 30	MR	18.86	17.76	05.83	15.43	13.58	11.98	81.82	76.47	06.53		
21	COI 22430	1.50		(25.74)	(24.92)	(13.97)	(23.13)	(21.62)	(20.25)	(64.76)	(60.98)	(14.81)		
28	CoP 22/137	1.67	MR	18.62	17.36	06.76	14.72	12.15	17.45	79.05	69.99	11.46		
20			1.07	1.07	1.07		(25.56)	(24.62)	(15.07)	(22.56)	(20.40)	(24.69)	(62.76)	(56.78)
29	CoP 22440	0.91	R	19.51	18.64	04.45	16.54	15.09	08.75	84.78	80.95	04.51		
		0.91	ĸ	(26.21)	(25.58)	(12.18)	(24.00)	(22.86)	(17.21)	(67.04)	(64.12)	(12.26)		
30	CoP 22442	1 25	MR	18.97	17.94	05.42	15.74	14.06	10.67	82.97	78.38	05.53		
		1.2.0	WIIX	(25.82)	(25.06)	(13.46)	(23.37)	(22.02)	(19.07)	(65.63)	(62.29)	(13.60)		
31	CoP 22441	0.40	R	20.32	19.49	04.08	17.49	16.27	06.97	86.08	83.47	03.03		
51		0.40		(26.79)	(26.20)	(11.65)	(24.72)	(23.79)	(15.31)	(68.09)	(66.01)	(10.02)		
32	CoP 18436	246	MS	16.91	14.97	11.47	11.71	08.96	23.48	69.24	59.85	13.56		
		2.10	1010	(24.28)	(22.76)	(19.80)	(20.01)	(17.42)	(28.98)	(56.32)	(50.68)	(21.61)		
33	CoLk 94184	2 32	MS	17.18	15.31	10.88	11.85	09.21	22.27	68.98	60.15	12.80		
55		2.52	IVID	(24.49)	(23.03)	(19.26)	(20.14)	(17.67)	(28.16)	(56.15)	(50.86)	(20.96)		
34	CoSe 16453	376	S	13.12	10.49	20.04	08.08	04.89	39.48	61.58	46.61	24.30		
51		5.70	5	(21.24)	(18.90)	(26.59)	(16.51)	(12.78)	(38.93)	(51.70)	(43.06)	(29.53)		
35	CoI k 16467	2 79	MS	16.34	14.21	13.03	11.34	08.32	26.63	69.40	58.55	15.63		
		2.19	1010	(23.84)	(22.15)	(21.16)	(19.68)	(16.76)	(31.07)	(56.42)	(49.92)	(23.29)		
36	CoV 92102	400	S	12.64	9.27	26.66	7.42	03.79	48.86	58.7	40.88	30.35		
	(Check)	T.00		(20.83)	(17.73)	(31.09)	(15.81)	(11.23)	(44.35)	(50.01)	(39.75)	(33.43)		
	SEm(±)			0.41	0.36	0.25	0.31	0.25	0.45	1.68	1.45	0.28		
	CD (5%)			1.17	1.03	0.73	0.88	0.70	1.28	4.74	4.10	0.78		
	CV			4.12	3.99	4.43	4.13	4.02	3.82	3.92	3.82	4.01		
	R-Resistant, MR-Moderately Resistant, MS- Moderately Susceptible, S- Susceptible													

moderately resistant from 0.98 kg to 0.73 kg, moderately susceptible from 0.62 kg to 0.49 kg, and susceptible varieties from 0.45 kg to 0.38 kg, with CoV 92102 at 0.31 kg. Weight reduction percentages were 4.44%-5.55% for resistant varieties, 6.66%-14.11% for moderately resistant, 18.42%-25.75% for moderately susceptible, and 27.41%-34.48% for susceptible varieties, with CoV 92102 showing the highest reduction at 42.59%.

The qualitative parameters of sugarcane, including brix %, sucrose %, and purity %, were recorded as shown in Table 4. In healthy plots, resistant varieties showed brix % values ranging from 20.41% (CoP 9301) to 19.51% (CoP 22440), moderately resistant from 19.06% (CoLk 20469) to 18.57% (CoLk 20468), moderately susceptible from 17.48% (CoP 20440) to 16.06% (CoBln 19501), and susceptible varieties from 15.03% (CoBln 17501) to 13.12% (CoSe 16453), with the check variety CoV 92102 at 12.64%. In diseased plots, brix % ranged from 19.61% to 18.64% for resistant varieties, 18.10% to 17.28% for moderately resistant, 15.73% to 13.82% for moderately susceptible, and 12.47% to 10.49% for susceptible varieties, with CoV 92102 at 9.27%. The reduction in brix % ranged from 3.91%-4.45% for resistant varieties, 5.03%-6.94% for moderately resistant, 10.01%-13.94% for moderately susceptible, and 17.03%-20.04% for susceptible varieties, with the check variety showing the highest reduction at 26.66%.

In healthy plots, sucrose % for resistant varieties ranged from 17.56% (CoP 9301) to 16.54% (CoP 22440), while moderately resistant varieties ranged from 16.02% (CoLk 20469) to 14.53% (CoLk 20468). Moderately susceptible varieties had values between 12.14% (CoP 20440) and 11.03% (CoBln 19501), and susceptible varieties from 9.06% (CoBln 17501) to 8.08% (CoSe 16453), with the check variety at 7.42% (CoV 92102). In diseased plots, sucrose % for resistant varieties ranged from 16.35% to 15.09%, moderately resistant from 14.50% to 11.85%, moderately susceptible from 9.28% to 7.62%, and susceptible from 6.05% to 4.89%, with CoV 92102 at 3.79%. The reduction in sucrose % ranged from 6.89%-8.75% for resistant varieties, 9.48%-18.44% for moderately resistant, 23.55%-30.94% for moderately susceptible, and 33.22%-39.48% for susceptible varieties, with CoV 92102 showing the highest reduction at 48.86%.

In healthy plots, purity % for resistant varieties ranged from 86.04% (CoP 9301) to 84.78% (CoP 22440), while moderately resistant varieties ranged from 84.05% (CoLk 20469) to 78.25% (CoLk 20468). Moderately susceptible varieties had purity % between 69.45% (CoP 20440) and 68.67% (CoBln 19501), and susceptible varieties ranged from 61.58% (CoSe 16453) to 60.27% (CoBln 17501), with the check variety (CoV 92102) at 58.70%. In diseased plots, purity % for resistant varieties ranged from 83.38% to 80.95%, moderately resistant from 80.12% to 68.57%, moderately susceptible from 58.99% to 56.36%, and susceptible from 48.51% to 46.61%, with CoV 92102 at 40.88%. Purity % reduction ranged from 3.07%-4.51% for resistant varieties, 4.67%-12.37% for moderately resistant, 15.06%-17.92% for moderately susceptible, and 19.51%-24.30% for susceptible varieties, with CoV 92102 showing the highest reduction at 30.35%.

The extent of losses on quantitative and qualitative cane parameters were observed for the thirty-six sugarcane varieties including one control (CoV 92102) against the wilt disease caused by Fusarium sacchari. The significant reductions in various sugarcane attributes, including germination percentage (3.68% to 36.47%), settling mortality (4.00% to 37.09%), cane height (5.31% to 28.63%), cane girth (2.69% to 38.67%), cane weight (4.44% to 42.59%), brix percentage (3.91% to 26.66%), sucrose percentage (6.89% to 48.86%), and purity percentage (3.03% to 30.35%) were observed. The results were as comparable to the findings of Minatullahet Viswanathan al. (2012).et al., (2012).Minnatullah&Kamat (2018) had also observed reduction in brix (16.60-20.80%), sucrose (31.60-38.26%) and purity (18.00-22.10%) of cane. Kumar et al., (2015) observed the reduction in sett germinability (40.2-50.1%) number of millable cane (39.9 to 50.9 %) cane yield (45.2-51.2 %) juice (10.0-14.9%), brix (31.4-44.8%) and purity (12.9-25.7%). Aaradhna and Minnatullah (2024) also found significant reductions in sugarcane attributes: germination (6.14%-38.20%), settling mortality (4.55%-41.24%), cane height (6.66%-27.83%), cane girth (2.67% - 45.16%), cane weight (6.40% - 47.27%), brix (4.04%-25.58%), sucrose (6.96%-49.16%), and purity (3.04%-31.69%).

Conclusion

The study assessed 36 sugarcane varieties for resistance to *Fusarium sacchari*, identifying seven as resistant, ten as moderately resistant, thirteen as moderately susceptible, and six as susceptible. The plug method effectively assessed sugarcane varieties for resistance to *Fusarium sacchari*, providing a controlled and reliable measure of their susceptibility. The results highlighted significant differences in resistance levels, aiding in the identification of varieties better suited for managing wilt disease. Resistant varieties showed the least reduction in germination, cane length, girth, weight, brix %, sucrose %, and purity %, while susceptible varieties experienced the highest reductions. These findings highlight the effectiveness of certain varieties in resisting wilt disease and underscore the importance of selecting resistant varieties to improve sugarcane productivity.

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