

INCIDENCE AND SEVERITY OF SUGARCANE MOSAIC VIRUS ON SUGARCANE CULTIVARS AT ILORIN, NIGERIA

• Aliyu, T. H., Balogun O. S. and Onidare, F.

Department of Crop Protection, Faculty of Agriculture, University of Ilorin
P.M.B. 1515, Ilorin – Nigeria

*Corresponding Author: Email: aliyutaiyehussein@yahoo.com; Phone No: +2348030472667

ABSTRACT

Experiment was conducted using potted plants to evaluate the incidence and severity of sugarcane mosaic disease in some local cultivars of the Unilorin Sugar Research Institute sugarcane germplasm. The experiment was laid out on a randomized complete block design where the 17 varieties constituted the only factor. Growth attributes such as plant height, number of leaves and number of tillers were measured. Some disease attributes such as symptom manifestation, number of leaves with virus infection, days to appearance of symptoms were also measured. Yield attributes including dry shoot and leaf weight, wet weight, percentage dry weight were also measured. Analysis of variance showed that incidence of viral disease increased with time as all plants taken at harvest. The severity on individual plants however varied as some plants manifested symptoms at 8 weeks after planting. The severity on individual plants however varied as some plants exhibited more tolerance than the others as shown by the yield parameters. Cv MCO270 was the most susceptible whereas a control termed the 'Isanlu Local' showed higher tolerance than most of the Unilorin varieties. This revealed the potentials of sugarcane cultivars with high levels of resistance to viruses' usefulness in breeding programmes. This is germane especially for sugarcane mosaic disease which is controlled primarily with host plant resistance. The avoidance of the planting and breeding of sugarcane varieties susceptible to sugarcane mosaic virus would have positive consequences on cane and sugar yield.

Keywords: Breeding, Germplasm, Sugarcane, Susceptible, Virus disease.

1.0 INTRODUCTION

Sugarcane (*Saccharum officinarum* (L.)) in the family Poaceae and the tribe Andropogoneae is a perennial crop, found in the tropics. It is a tall growing monocotyledonous crop plant that is cultivated in the tropics and subtropics of the world primarily for its ability to store high concentration of sugar or sucrose in the internodes of the stem (Cox *et al.*, 2000). Sugarcane is an important crop, which has been known for at least 2200 years. It occurs in the wild from Eastern and Northern Africa through the Middle East to India, China, Taiwan and Malaysia through the Pacific to New Guinea and finally introduced and cultivated in Africa, during the slave trade (Opeke, 2005).

Sugarcane is primarily grown as a source of sugar but is utilized for various purposes including human consumption, industrial uses and for livestock feed. The industrial wastes such as molasses are used for the synthesis of alcohol, while bagasse is used as fodder for farm animals during the winter season (Subhani *et al.*, 2008).

The major pests and diseases that cause losses in sugarcane production includes cane grubs, feral pigs, ratoon stunting diseases, sugarcane rusts, chlorotic streak and soil-borne diseases (McLeod *et al.*, 1999). Some bacterial diseases include ratoon stunting disease and Leaf scald. Fungal diseases include orange rust, sugarcane rust, pachymetra root rot, and sugarcane smut, which cause severe stunting (Agnihotri, 1990). Mosaic disease is one of the primary viral plant infections that affects sugarcane crops worldwide, with recorded disease incidence in almost all of the major sugarcane-growing countries (Xu *et al.*, 2008). Sugarcane mosaic is caused by a number of potyviruses such as sugarcane mosaic virus (SCMV). The mosaic symptom pattern appears in young growing leaves, causing systemic infection of the sugarcane plant and stunting of the whole plant (Agrios, 2005). Crop losses caused by SCMV however depend on many factors, including the susceptibility of the cultivars to the prevailing strains of SCMV, the incidence of infection, the prevailing environmental conditions, the stage of growth when infection occurs, and interaction with other agents affecting the crop (Xu *et al.*, 2010). In view of the continuing economic importance of sugarcane and the potential disaster that an outbreak of sugarcane mosaic disease portends, the objectives of this study is to evaluate the incidence of sugarcane mosaic disease in the Unilorin Sugarcane germplasm, determine the level of resistance or tolerance of the screened cultivars.

2.0 MATERIALS AND METHODS

2.1 Site Description, Soil Type and Experimental Design

The experiment was conducted at the Crop Protection Pavilion of the Faculty of Agriculture, University of Ilorin-Nigeria. The agroecological zone is derived guinea savannah and it is located between Latitude 8° 24'N and longitude 4° 10'E. Ilorin, the capital city of Kwara State, is situated at a strategic point between the densely populated south western and the sparsely populated middle belt of Nigeria. The temperature of Ilorin ranges from 33°C to 34°C from November to January while from February to April; the value ranges from 34°C to 53°C. The total annual rainfall in the area is about 1200mm and the relative humidity in the wet season is between 75 to 80% while in the dry season it is about 65% (Jimoh, 2003).

The soil type used was sandy loam soil that was collected at the fallow land close to the pavilion, Department of Agriculture, University of Ilorin. The soil was air dried for 24 hours after collection and sieved to remove pebbles, stone and roots of previous plants. Thereafter, 3 kg of processed soil was weighed into small 10 litre capacity plastic pots and arranged in a randomized complete blocks design.

2.2 Sourcing of Sugarcane Germplasm

Sixteen varieties of sugarcane were obtained from the University of Ilorin sugarcane Research Institute Germplasm unit and another 1 variety ('Isanlu local') was collected from local sugarcane farmers in Isanlu, Kogi State-Nigeria. The 17 varieties of sugarcane planted were: CB 512168, IB 34185, IB 55192, LSI 25, LSI 26, LSI 27, LSI 29, LSI 31, LSI D33, LSI 54, MCO 270, MY 210, Q 70, USRI 85/031, USRI 85/046, USRI 86/004 and 'Isanlu Local'.

2.3 Planting Operations Sugarcane

Stalks were cut into small setts with at least one bud per sett. The planting was done by planting a sett per pot and replicated three times. Watering was carried out on daily basis and 6 weeks after planting, NPK 26:10:10 fertilizer was applied banded at the rate of 120N-60P₂O₅-90K₂O Kg ha⁻¹. Hand weeding was done to remove weeds, competing with the plant in pot and around the buckets as and when necessary.

2.4 Data Collection and Analysis

Starting from zero to four weeks after planting, data were collected on variables such as the days of appearance of disease symptom, number of plants affected per variety, number of leaves with infection per plant, number of leaves without infection and the stalk length. At harvest, fresh weight of plants stalks was taken. The oven dried weights were also obtained. All data were subjected to analysis of variance using the Statistical package for social scientists (SPSS) version 21. Treatment means, where necessary, were partitioned using the New Duncan's Multiple Range Test at 5% level of significance.

3.0 RESULTS AND DISCUSSION

3.1 Symptom Manifestation

The symptom manifested by sugarcane varieties infected by the sugarcane mosaic virus disease included irregular mosaic patterns on the young leaves, which usually became less prominent as the leaves aged. Such leaves dried up sooner than later. Plates 1-3 show the symptoms of variety MCO 270 at various stages of growth. Plate 1 shows the young sugarcane plant manifesting severe mosaic disease on the leaves, while Plate 2 shows severe stunting of the same plant 5 months after the initial manifestation of the mosaic disease. It can be seen from Plate 2 that the mosaic symptom had become virtually masked on the leaves of the plant.



Plate 1: cv MCO 270 plant manifesting severe planting mosaic disease at 3months after planting



Plate 2: cv. Mco270 showing severe stunting 5 months after



Plate 3 on the other hand shows the 'Isanlu local' virtually free of mosaic symptoms 5 months after planting

3.2 Days to Appearance of Disease Symptoms

Table 1 shows the average number of days after planting to the appearance of disease symptoms in the sugarcane cultivars. Significant differences ($P < 0.05$) existed between the cultivars as regards the time it took for symptoms to manifest on plants. The values ranged between 22 days in variety MCO 270 to 51 days in variety IB 34185. This result indicated that there is a strong correlation between the resistance of a variety and the number of days between infection and the appearance of symptoms. Sugarcane Mosaic Virus infection caused a systemic infection of the sugarcane plant and the symptoms manifested as mosaic. The symptoms are contrasting shades of green on a background of paler green to yellow chlorotic areas which were observed mostly on the leaves. This observation corroborates the views of Rott *et al.* (2008) and Handley *et al.* (2001) that Sugar cane Mosaic Virus causes systemic infection of the sugarcane plant with the symptoms observed primarily by leaf symptoms which may differ in intensity with the sugarcane variety.

Table 1: Average number of days to appearance of disease symptom

Varieties appearance of disease symptoms	Average number of days to
IB34185	50.7 ^c
IB55192	29.0 ^{bcd}
ISANLU LOCAL	32.3 ^d
LSI 25	29.0 ^{bcd}
LSI 26	27.3 ^b
LSI 27	29.0 ^{bcd}
LSI 29	31.0 ^{bcd}
LSI 31	29.7 ^{bcd}
LSI 33	28.7 ^{bcd}
LSI 54	50.3 ^c
MCO 270	21.7 ^a
MY 210	49.7 ^c
Q70	30.7 ^{bcd}
USRI 85/031	28.7 ^{bcd}
USRI 85/046	27.7 ^{bcd}
USRI 86/004	31.3 ^{bcd}
S E	1.102

Means within a column with the same superscript were not significantly different at $P < 0.05$

3.3 Incidence of Viral Disease

Table 2 shows percentage infected plants at different times after planting. Analysis of variance showed that at day 28, varieties IB 34185, ISANLU LOCAL, LSI 29, LSI 33, LSI 54, MY 210, Q70 and USRI 85/031 were yet to manifest any symptoms whereas others had some levels of infections. At day 42, almost all the varieties manifested symptoms except IB 34185 and MY 210, while IB 55192, LSI 25, LSI 33, MCO 0270, USRI 85/046 and USRI 86/004 were 100% infected. At day 56 all of the sugarcane plants were infected, i.e. with 100% infection.

Table 2: Percentage infected plants (incidence of viral disease)

Effect of sugar cane mosaic virus on sugar cane cultivars

Varieties	28	42	56
CB512168	33.3 ^{ab}	66.7 ^{ab}	100.0 ^a
IB 34185	0.0 ^a	0.0 ^a	100.0 ^a
IB55192	66.7 ^{bc}	100.0 ^b	100.0 ^a
ISANLU LOCAL	0.0 ^a	33.3 ^{ab}	100.0 ^a
LSI 25	100.0 ^c	100.0 ^a	100.0 ^a
LSI 26	33.3 ^{ab}	66.7 ^{ab}	100.0 ^a
LSI 27	100.0 ^c	33.3 ^{ab}	100.0 ^a
LSI 29	0.0 ^a	66.7 ^{ab}	100.0 ^a
LSI 31	33.3 ^{ab}	66.7 ^{ab}	100.0 ^a
LSI 33	0.0 ^a	100.0 ^b	100.0 ^a
LSI 54	0.0 ^a	33.3 ^{ab}	100.0 ^a
MCO 270	66.7 ^{bc}	100.0 ^b	100.0 ^a
Y 210	0.0 ^a	0.0 ^a	100.0 ^a
Q 70	0.0 ^a	66.7 ^{ab}	100.0 ^a
USRI 85/031	0.0 ^a	66.7 ^{ab}	100.0 ^a
USRI 85/046	33.3 ^{ab}	100.0 ^b	100.0 ^a
USRI 86/004	38.3 ^{ab}	100.0 ^b	100.0 ^a
S.E	18.101	20.712	0.00

Means within a column with the same superscript were not significantly different at $P < 0.05$

3.4 Severity of Viral Disease

Table 3 which shows the percentage of sugarcane leaves showing symptoms of viral disease is a measure of the severity of the disease. The result indicates that at 56 days after planting, variety USRI 85/031 had the lowest disease severity (19%) closely followed by 'ISANLU LOCAL' (20%). However some 90 days after, while the 'ISANLU LOCAL' had a marginal increase of disease severity (20.6%) to remain the significantly least ($P < 0.05$) infected, variety LSI 25 had 100% disease severity. The incidence and severity of sugarcane mosaic virus disease on the sugarcane cultivars suggest that susceptibility is cultivar dependent. The study showed that the virus disease was more prevalent in some of the cultivars compared to others. Whereas cultivars MCO 270, IB 55192 and LSI 25 were highly susceptible to the viral disease, the 'Isanlu Local', CB 512168, LSI 27, LSI 29, USRI85/046, USRI86/004 were more tolerant to the virus pathogen. This confirms that virus disease infection and intensity is variety dependent in the sugarcane cultivars. The different response manifested by the cultivars is thought to be related to Ribo-nucleic acid (RNA) gene silencing. Gene silencing in plants is a molecular process involved in the down regulation of specific genes, and is a genetic defense system against viruses and invading nucleic acids. Waterhouse *et al* (2001); Wassenegeger, (2002) and Eamens *et al*. (2008) are also of the opinion that plants expressing one of these viral proteins generally conferred resistance to the virus from which the protein sequences were derived.

Table 3: Percentage of sugarcane leaves showing symptoms (severity of viral disease)

Varieties	DAY					
	56	70	84	98	140	154
CB512168	61.9 ^{bcde}	65.5 ^{abcd}	44.4 ^{abcd}	45.8 ^{abc}	21.9 ^{ab}	29.6 ^{ab}
IB34185	50.0 ^{bc}	66.7 ^{abcd}	54.2 ^{bcd}	41.7 ^{abc}	56.7 ^{de}	56.5 ^{cd}
IB55192	73.8 ^{cde}	65.0 ^{abcd}	62.2 ^{cd}	41.7 ^{abc}	72.1 ^e	100.0 ^e
ISANLU LOCAL	20.0 ^a	52.4 ^{ab}	29.2 ^{ab}	31.1 ^a	19.3 ^a	20.6 ^a
LSI 25	80.1 ^d	71.0 ^{bcde}	60.6 ^{bcd}	57.2 ^c	69.4 ^e	100.0 ^c
LSI 26	41.1 ^{ab}	56.5 ^{abc}	50.0 ^{bcd}	32.2 ^a	32.9 ^{abc}	36.5 ^{abc}
LSI 27	79.4 ^{cde}	85.7 ^e	64.8 ^d	36.7 ^{ab}	58.2 ^{de}	54.2 ^{cd}
LSI 29	84.7 ^{de}	66.9 ^{abcd}	60.7 ^{bcd}	45.8 ^{abc}	46.4 ^{cd}	51.3 ^{bcd}
LSI 31	62.7 ^{bcde}	61.6 ^{abcd}	65.8 ^d	42.4 ^{abc}	30.6 ^{ab}	29.2 ^{ab}
LSI 33	64.6 ^{bcde}	53.6 ^{ab}	56.4 ^{bcd}	27.8 ^a	32.9 ^{abc}	45.1 ^{bcd}
LSI 54	60.0 ^{bcd}	63.1 ^{abcd}	43.3 ^{abcd}	56.0 ^{bc}	68.1 ^e	47.6 ^{bcd}
MCO 270	65.5 ^{bcde}	76.8 ^{de}	60.4 ^{bcd}	57.4 ^c	100.0 ^f	100.0 ^e
MY 210	56.2 ^{bcd}	61.8 ^{abcde}	54.8 ^{bcd}	58.4 ^c	62.7 ^e	66.1 ^d
Q 70	91.7 ^e	75.0 ^{cde}	48.9 ^{abcd}	44.4 ^{abc}	37.1 ^{bc}	41.7 ^{abc}
USRI 85/031	19.0 ^a	62.7 ^{abcd}	32.7 ^{abc}	27.8 ^a	32.0 ^{bc}	35.6 ^{abc}
USRI 85/046	56.7 ^{bcd}	49.8 ^a	54.2 ^{bcd}	43.9 ^{abc}	29.7 ^{ab}	27.3 ^{ab}
USRI 86/004	83.8 ^d	69.0 ^{bcde}	19.0 ^a	38.6 ^{bc}	19.4 ^a	27.8 ^{ab}
S.E	8.923	5.687	9.332	6.012	4.865	7.396

Means within a column with the same superscript were not significantly different at $P < 0.05$ using

3.5 Stalk Length

Table 4 shows varying stalk length categories of the varieties at different times after planting. The varieties 'ISANLU LOCAL', LSI 33, LSI 54, MY 210, and Q 70 fall in the same category with the lowest length at days 28 after planting. Varieties CB512168, IB 34185, IB55192, LSI250, LSI 26, LSI 27, LSI29,

MCO 270, USRI 85/031, USRI 85/046 and USRI 86/004 were also not significantly different ($P < 0.05$). Varieties LSI 29 and LSI 31 had the longest stalks at day 28. Subsequently from day 112 to 154 days after planting, there was rapid increase in stalk length and similar plant heights.

Table 4: Stalk length of sugarcane varieties at different times after planting

Varieties	DAY				
	28	112	126	140	154
CB512168	6.7 ^{cdef}	36.0 ^{def}	43.5 ^{ef}	46.5 ^{def}	48.0 ^{de}
IB34185	9.9 ^{fg}	39.7 ^{ef}	47.0 ^{fg}	50.7 ^f	53.0 ^e
IB55192	8.3 ^{def}	25.0 ^{abc}	27.7 ^{abc}	39.5 ^{cdef}	42.1 ^{cde}
ISANLU LOCAL	1.7 ^a	31.0 ^{bcd}	29.3 ^{abcd}	46.0 ^{def}	48.3 ^{de}
LSI 25	8.8 ^{defg}	24.3 ^{abc}	22.0 ^a	29.5 ^{ab}	27.2 ^{ab}
LSI 26	8.1 ^{defg}	24.0 ^{abc}	25.3 ^{abc}	32.3 ^{abc}	34.5 ^{cd}
LSI 27	9.0 ^{efg}	29.0 ^{abcd}	31.7 ^{abcd}	46.0 ^{def}	48.7 ^{de}
LSI 29	11.3 ^g	32.1 ^{cde}	35.7 ^{cdef}	44.0 ^{cdef}	46.3 ^{cde}
LSI 31	15.1 ^h	43.7 ^f	57.3 ^g	63.0 ^g	65.0 ^f
LSI 33	4.5 ^{abc}	21.5 ^{ab}	22.8 ^{ab}	24.0 ^a	25.3 ^a
LSI 54	5.5 ^{bcd}	26.5 ^{abcd}	26.7 ^{abc}	27.0 ^{ab}	27.0 ^{ab}
MCO 270	8.5 ^{defg}	20.7 ^a	21.3 ^a	24.0 ^a	24.7 ^a
MY 210	4.5 ^{abc}	34.0 ^{cdef}	24.5 ^{bcd}	36.5 ^{bcd}	41.0 ^{cde}
Q 70	2.5 ^{ab}	29.7 ^{abcde}	32.7 ^{abcde}	36.0 ^{abcd}	38.7 ^{bcd}
USRI 85/031	6.2 ^{cde}	31.7 ^{bcd}	35.5 ^{cdef}	39.7 ^{def}	43.3 ^{de}
USRI 85/046	6.4 ^{cde}	36.0 ^{def}	40.7 ^{bcd}	49.0 ^{ef}	51.3 ^{de}
USRI 86/004	7.9 ^{def}	30.7 ^{abcde}	29.0 ^{abcd}	48.3 ^{def}	49.7 ^{de}
S.E	1.004	3.165	3.743	3.871	3.976

Means within a column with the same superscript were not significantly different at $P < 0.05$

3.6 Total Number of Leaves per Plant

Table 5 shows the total number of leaves per plant at different times after planting. At day 28 variety 'ISANLU LOCAL' had the significantly lowest ($P < 0.05$) number of leaves per plant (1.7) while the variety MCO 270 had the highest number (5.0). At day 126 after planting variety USRI 86/004 had the significantly highest ($P < 0.05$) number of leaves per plant (12.7) and variety USRI 85/046 the lowest (7.3). However, by 154 days after planting, there was a reduction in the number of leaves per plant in the varieties as a result of leaf necrosis caused majorly by virus infection.

Table 5: Total number of leaves per plant

Varieties	DAY			
	28	56	126	154
CB512168	3.3 ^{cd}	7.0 ^{cd}	9.7 ^{ab}	7.0 ^{ab}
IB34185	3.0 ^{bcd}	6.0 ^{abcd}	8.3 ^{ab}	7.9 ^{abc}
IB55192	3.0 ^{bcd}	6.3 ^{abcd}	8.0 ^a	7.8 ^{abc}
ISANLU LOCAL	1.7 ^a	5.3 ^{ab}	8.3 ^{ab}	7.9 ^{abc}
LSI 25	3.7 ^d	6.7 ^{bcd}	8.0 ^{ab}	7.0 ^{ab}
LSI 26	2.7 ^{bcd}	5.7 ^{abc}	10.0 ^{ab}	9.3 ^{bcd}
LSI 27	3.0 ^{bcd}	6.7 ^{bcd}	10.0 ^{ab}	9.3 ^{bcd}
LSI 29	2.3 ^{bc}	6.7 ^{bcd}	9.3 ^a	8.3 ^{abc}
LSI 31	3.3 ^{cd}	6.3 ^{abcd}	11.0 ^{ab}	10.7 ^{ab}
LSI 33	3.0 ^b	6.7 ^{bcd}	9.0 ^{ab}	8.9 ^{cd}
LSI 54	2.0 ^b	5.0 ^a	8.0 ^a	7.0 ^{ab}
MCO 270	5.0 ^e	7.3 ^d	9.7 ^{ab}	8.3 ^{abc}
MY 210	3.7 ^d	6.3 ^{abcd}	10.0 ^{ab}	7.7 ^{ab}
Q 70	2.3 ^{bc}	7.3 ^d	8.7 ^{ab}	8.0 ^{abc}
USRI 85/031	2.3 ^{bc}	5.3 ^{ab}	7.3 ^a	8.7 ^{bc}
USRI 85/046	2.3 ^{bcd}	6.3 ^{abcd}	12.7 ^c	6.0 ^a
USRI 86/004	2.7 ^{bcd}	0.582	0.868	11.3 ^d
S.E	0.343			0.765

Means within a column with the same superscript were not significantly different at $P < 0.05$

3.7 Days to Tillering and the Number of Tillers per Plant

Table 6 shows mean number of days to tillering and the total number of tillers per plant at 112 days after planting. The Table (7) indicated that there were no significant differences ($P < 0.05$) among the varieties in the number of days to tillering. However, varieties with the significantly highest ($P < 0.05$) mean number of tillers at 112 days after planting were; LSI 27 (7.0), USRI 86/004 (10.0) and MCO 270 (8.3) while the significantly lowest ($P < 0.05$) mean number of tillers was in LSI 54 (0.7). The more susceptible varieties generally possessed lower growth attributes in terms of stalk length, number of leaves per plant, days to tillering and number of tillers per plant. These reductions could be attributed to the sugarcane mosaic virus disease infection which likely caused a reduction in the contents of photosynthetic leaf

pigments and in the chlorophyll ratio along with ultra structural changes in the cell chloroplasts. These assertions are also representative views of Goncalves *et al.*, (2005) and Yan *et al.* (2009).

Table 6: Mean number of days to tillering and number of tillers per plant

Varieties	Days to tillering	Number of tillers at day 112
IB34185	74.7 ^a	2.7 ^{ab}
IB55192	41.3 ^a	2.7 ^{ab}
ISANLU LOCAL	42.3 ^a	5.7 ^{bcd}
LSI 25	48.3 ^a	3.3 ^{ab}
LSI 26	48.3 ^a	5.3 ^{bcd}
LSI 27	58.0 ^a	7.0 ^{cde}
LSI 29	48.0 ^a	3.3 ^{ab}
LSI 31	50.0 ^a	2.3 ^{ab}
LSI 33	42.3 ^a	5.0 ^{bcd}
LSI 54	52.7 ^a	0.7 ^a
MCO 270	44.3 ^a	8.3 ^{de}
MY 210	52.0 ^a	4.7 ^{bc}
Q 70	44.7 ^a	3.7 ^{abc}
USRI 85/031	59.0 ^a	5.0 ^{bcd}
USRI 85/046	56.7 ^a	5.0 ^{bcd}
USRI 86/004	50.7 ^a	10.0 ^e
S.E	10.822	1.641

Means within a column with the same superscript were not significantly different at $P < 0.05$

3.8 Yield Attributes

Table 7 shows the wet shoot weight (g), dry shoot weight (g), percentage dry stalk weight and stalk girth (cm) of the sugarcane cultivars. The wet shoot weights were significantly highest ($P < 0.05$) for cultivars LSI 31 (253.6g) and 'ISANLU LOCAL' (204.8g). Dry shoot weights were also significantly ($P < 0.05$) highest in the two varieties with values of 88.1g and 79.8g respectively. Percentage dry stalk weight was not significantly different ($P < 0.05$) but stalk girth were significantly highest ($P < 0.05$) in cultivars LSI 26 (2.6cm), LSI 27 (2.6cm) and USRI 85/031 (2.6cm).

The reduction in yield attributes was probably due to virus infection which interfered with the phloem sugar transport as a result of the alteration in photosynthetic metabolism and plant disorders. Schenck *et al.* (2001) are of the opinion that yield reduction of virus infected plants was expected since mosaic and reduction in plant growth attributes are characteristic symptoms of virus disease infection in sugarcane cultivars.

Table 7: Selected yield parameters in sugarcane cultivars

Varieties	Wet shoot weight (g)	Dry shoot weight (g)	% dry stalk weight	stalk girth (cm)
CB512168	144.2 ^{abcd}	58.9 ^{abcde}	22.7 ^a	2.1 ^{cd}
IB34185	127.8 ^{abcd}	54.2 ^{abcde}	23.3 ^a	2.1 ^{cd}
IB55192	125.0 ^{abcd}	39.8 ^{abcd}	23.5 ^a	2.2 ^{cde}
ISANLU LOCAL	204.8 ^{de}	79.8 ^e	21.6 ^a	3.0 ^g
LSI 25	70.9 ^{ab}	27.1 ^a	21.3 ^a	1.6 ^a
LSI 26	143.2 ^{abcd}	57.9 ^{abcde}	25.5 ^a	2.6 ^f
LSI 27	177.3 ^{cde}	66.8 ^{cde}	20.9 ^a	2.6 ^f
LSI 29	154.9 ^{abcd}	60.2 ^{abcde}	21.4 ^a	2.2 ^{cde}
LSI 31	253.6 ^e	88.1 ^e	18.6 ^a	2.0 ^{bc}
LSI 33	97.6 ^{abcd}	33.6 ^{abc}	19.2 ^a	2.4 ^{ef}
LSI 54	64.8 ^a	26.4 ^a	22.5 ^a	2.5 ^f
MCO 270	87.8 ^{abc}	31.2 ^{abc}	19.7 ^a	1.8 ^{ab}
MY 210	158.6 ^{abcd}	73.2 ^{de}	25.9 ^a	1.8 ^{ad}
Q 70	112.1 ^{abcd}	41.3 ^{abcd}	20.2 ^a	1.7 ^a
USRI 85/031	167.6 ^{cde}	62.2 ^{bcd}	20.7 ^a	2.6 ^f
SRI 85/046	108.8 ^{abc}	40.3 ^{abcd}	22.8 ^a	2.4 ^{def}
USRI 86/004	164.3 ^{bcd}	72.5 ^{de}	24.9 ^a	2.2 ^{cde}
S.E	27.721	10.476	22.508	0.941

Means within a column with the same superscript were not significantly different at $P < 0.05$

4.0 CONCLUSION

The observed different levels of susceptibility in the sugarcane varieties indicate potential for continued breeding programme that will eventually lead to having relatively suitable varieties that may be recommendable to local growers for sustainable

and higher sugarcane productivity in Nigeria. The avoidance of the planting and breeding of highly susceptible seed cane varieties in Nigeria can have serious positive consequences on cane and sugar yield.

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