



**INFLUENCE OF SORGHUM-LEGUME INTERCROP ON SORGHUM
(*SORGHUM BICOLOR* L. MOENCH) PRODUCTIVITY AND SEVERITY OF
STRIGA INFESTATION IN BAUCHI STATE**

Sunday, I*, Sabo, M. U., Shuaibu. Y. M. and Babagana, B. M.

Department of Crop Production, Abubakar Tafawa Balewa University, Bauchi, Bauchi State, Nigeria

***Corresponding Author's Email:** ishakusunday9@gmail.com, **GSM:** 07068618738

ABSTRACT

A field experiment was conducted during the 2023 and 2024 rainy season at Abubakar Tafawa Balewa University Teaching and Research Farm Bauchi to determine the influence of sorghum-legume intercrop on sorghum productivity and severity of *Striga* infestation. The treatments consisted of two sorghum varieties (SK-5912 and CSR-01), three different legume types, Groundnut (Dakar), Cowpea (Kwankwasiya) and soybean (TGZ 1951) and two (2) spatial arrangements (1:2 and 1:3). These were factorially combined to give 14 treatments combination and laid out in a randomized complete block design (RCBD) with three replications. All the data collected were subjected to analysis of variance (ANOVA) to test the level of significance of all the treatment. Duncan's Multiple Range Test (DMRT) was adopted to separate significantly different treatment means. The results revealed a significant ($P \leq 0.05$) response of sorghum varieties to the cropping system. Sorghum variety SK-5912 produced significantly taller plants at 4 and 6 weeks after sowing (WAS) during the 2023 season, while cropping system 1 resulted in taller plants throughout the study period. In terms of the number of leaves, variety SK-5912 produced a higher number of leaves at 10 WAS during the 2024 season, while cropping systems 2, 3, and 4 produced more leaves at 8 WAS, and cropping system 3 outperformed at 10 WAS. The results further indicated that cropping systems 2, 3, and 4 significantly produced a larger leaf area throughout the study period. Additionally, SK-5912 and cropping systems 1 and 2 resulted in greater panicle length, panicle weight, 1000-grain weight, and grain yield per hectare in both seasons. A land equivalent ratio (LER) of 1.15 demonstrated the advantage of intercropping one row of sorghum with two rows of groundnut. Furthermore, SK-5912 and intercropping one row of sorghum with two rows of groundnut produced fewer *Striga* plants per plot at both the growth and yielding stages during the 2024 season. Based on the findings of this study, it is recommended that farmers in the study area adopt the cultivation of sorghum variety SK-5912 intercropped with groundnut at a 1:2 ratio to enhance sorghum productivity and reduce *Striga* infestation.

Keywords: Sorghum, Variety, Legume, Intercropping, *Striga*

INTRODUCTION

Sorghum (*Sorghum bicolor* L. Moench) is one of the most important cereal crops globally, ranked fifth in terms of production and consumption after wheat, rice, maize, and barley (FAO, 2019; Shuaibu *et al.*, 2021). It is a drought-tolerant, C4 photosynthetic plant capable of growing in arid and semi-arid environments, making it a strategic crop for food and livelihood security, especially in Sub-Saharan Africa (Vaezi Rad *et al.*, 2020). Nigeria ranks as the highest producer of sorghum in Africa, with an estimated production of 6.9 million tonnes annually (FAOSTAT, 2013), where it serves as a staple food, animal feed, and industrial raw material (Ahmad *et al.*, 2020).

Despite its potential, sorghum production faces major constraints, particularly declining soil fertility and parasitic weed infestation, notably by *Striga hermonthica* (Oswald, 2005). In Sub-Saharan Africa, over 21 million hectares of cereal crops are infested by *Striga*, leading to yield losses of up to 100% in severely affected fields (Griessel *et al.*, 2004; Nyongesa *et al.*, 2018). In addition, continuous monocropping, inappropriate fertilizer management, and land fragmentation due to increasing population pressure have further reduced sorghum productivity (Kilambya & Witwer, 2013; Karanja *et al.*, 2014). Intercropping, the cultivation of two or more crops simultaneously on the same field, has been advocated as a sustainable approach to enhancing soil fertility and maximizing land use (Iqbal *et*



al., 2019; Layek *et al.*, 2018). In cereal-legume intercropping systems, legumes such as groundnut, cowpea, and soybean biologically fix nitrogen, contributing to improved nutrient cycling and overall soil health (Ladha & Chakraborty, 2016; Mugi-Ngenga *et al.*, 2021). Such systems also offer a practical strategy for suppressing *Striga* infestation by promoting suicidal germination through false-host mechanisms and improving crop competition (Midega *et al.*, 2018; Khan *et al.*, 2020). Despite the promising potential of sorghum-legume intercropping, empirical evidence on its effectiveness under varying spatial arrangements and legume species remains limited, particularly within the dryland farming systems of Northern Nigeria. While groundnut has shown better drought tolerance and nitrogen fixation compared to other legumes (Franke *et al.*, 2018; Witcombe & Tiemann, 2022), optimal combinations of sorghum varieties, legume species, and planting patterns for maximizing yield and minimizing *Striga* severity remain unclear. This study, therefore, evaluates the performance of sorghum-legume intercrops using different spatial arrangements to determine their influence on sorghum yield and *Striga hermonthica* suppression in Bauchi State, Nigeria.

MATERIAL AND METHODS

Experimental Site

A field experiment was conducted during the 2023 and 2024 rainy seasons at the Teaching and Research Farm of Abubakar Tafawa Balewa University, Bauchi State, Nigeria, located at 10°22'N latitude, 9°47'E longitude, and an elevation of 1300 meters above sea level. in the Northern Guinea Savanna Agro-ecological zone of Nigeria.

Treatments and Experimental Design

Treatments consisted of two sorghum varieties (SK-5912 and CSR-01), three legume species (groundnut - Dakar, cowpea - Kwankwasiya, and soybean - TGZ-1951), and two spatial arrangements (1:2 and 1:3, representing one row of sorghum to two or three rows of legume, respectively), factorially combined to give a total of 14 treatments and arranged in a randomized complete block design (RCBD) with three replications. A sole cropping control was also included for comparison. Each plot measured 16 m², with 0.5 m and 1.0 m spacing used as plot and block separations, respectively.

Experiment materials and their sources

The experimental materials consisted of two sorghum varieties (SK-5912 and CSR-01) and three different legume types; Groundnut (Dakar), Cowpea (Kwankwasiya) and soybean (TGZ-1951) which was obtained from the seed multiplication unit at Bauchi State Agricultural Development Programme (BSADP).

Data Collection

Plant height (cm)

This data was taken by measuring the height of the plant from the ground to the top of the plant using measuring tape biweekly interval from 4 to 10 weeks after sowing (WAS).

Numbers of leaves

This data was collected by manually counting all the leaves per plant from 4 to 10 weeks after sowing (WAS).

Leaf area (cm)

Leaf was taken by measuring length by breadth of the leaf. It was done by using a measuring taped biweekly from 4 to 10 weeks after sowing (WAS).

Panicles length (cm)

Panicle length was measured using a tape by measuring the panicle from the base of the flag leaf to the top of the panicle.

1000-Grain weight (g)

After threshing plot harvested was composited and from it 1000 grains were randomly collected and weighed per plot.

Grain yield (kg/ha)

The data was collected by weighing the grains in each plot after threshing using measuring scale and was calculated in kilograms from individual and then projected per hectare.



Number of *Striga* per plot

This data was collected by manually counting the number of *Striga* emerged per plot at growth and yielding stage.

Data Analysis

All the data collected were subjected to analysis of variance (ANOVA) using SPSS v.22. to test the level of significance of all the treatment. Duncan's Multiple Range Test (DMRT) was however adopted during the analysis to separate significantly different treatment means.

RESULT AAND DISCUSSION

Influence of Sorghum-Legume Intercrop on Plant Height of Sorghum

Effect of Sorghum-Legume Intercrop on plant height is presented in Table 1 and 2. The results showed that significant ($P \leq 0.05$) difference exists among the treatments used with respect to plant height. The result further revealed that, except at 4 and 6 WAS where significant difference exists, no significant difference was observed in respect to variety throughout the study period in 2023. The result also indicated that, sorghum variety Sk-5912 significantly ($P \leq 0.05$) produced the tallest plants than CRS-01. Cropping system on the other hand, intercropping one row of sorghum with two rows of Groundnut (1:2) significantly ($P \leq 0.05$) produced the tallest plants throughout the growing season than the other row arrangements considered.

In 2024 study, the result showed no significant ($P \leq 0.05$) effect in terms of variety while row arrangement of 1 row of sorghum to 2 rows of Groundnut (1:2) significantly ($P \leq 0.05$) produced the taller plants at 8 and 10 WAS than the other row arrangements used. However, no significant difference was observed during the other weeks of study. The significant difference observed in this study with respect to variety could be due to genetic variation and better adaptation to environmental factors. The results of this study are in line with the findings of Eaton *et al.*, 2017 who reported that, variations in plant height among varieties were most probably due to plant genetic makeup and the quality of planting (seed) materials used. Intercropping with groundnut led to increase in growth parameters due to the increase in nitrogen content of soil through nitrogen fixation by legume crops, enhances the photosynthesis and metabolic activities of plants, which reflected on the increase in vegetative growth of sorghum. Similar finding was reported by Berhane *et al.*, 2015.

Table 1: Influence of Sorghum-Legume Intercrop on Plant Height of Sorghum during 2023 Season

Treatments	Plant height			
	4WAS	6WAS	8WAS	10WAS
Variety (V)				
Sk-5912	14.77 ^a	15.20 ^a	49.52	98.03
CSR-01	13.49 ^b	14.83 ^b	46.28	94.95
LS	**	**	NS	NS
SE (\pm)	0.27	0.66	1.45	
Cropping System (C)				
Groundnut (1:2)	15.20 ^a	24.90 ^a	60.67 ^a	119.67 ^a
Groundnut (1:3)	14.83 ^a	21.53 ^{ab}	41.85 ^b	92.60 ^b
Cowpea (1:2)	13.92 ^{ab}	21.95 ^{ab}	47.33 ^b	96.42 ^b
Cowpea (1:3)	14.02 ^{ab}	20.16 ^b	44.70 ^b	92.50 ^b
Soybean (1:2)	15.35 ^a	21.83 ^{ab}	44.42 ^b	92.17 ^b
Soybean (1:3)	13.10 ^b	20.63 ^b	50.33 ^b	93.58 ^b
Sole	12.50 ^b	19.36 ^b	46.00 ^b	88.50 ^b
LS	**	**	**	**
SE (\pm)	0.51	1.25	2.70	6.65
Interaction				
V x C	NS	NS	NS	NS

Means followed by the same letter within the same column are not statistically different following DMRT. LS= Level of Significance, SE=Standard Error, **= significance at 0.01, *=significance at 0.05 and NS= Not Significant



Table 2: Influence of Sorghum-Legume Intercrop on Plant Height of Sorghum during 2024 Season

Treatments	Plant height			
	4WAS	6WAS	8WAS	10WAS
Variety (V)				
Sk-5912	15.05	27.41	52.71	99.13
CSR-01	14.72	25.96	51.23	98.32
LS	NS	NS	NS	NS
SE (\pm)	0.41	0.85	0.94	3.23
Cropping System (C)				
Groundnut (1:2)	16.70	26.83	65.00 ^a	118.33 ^a
Groundnut (1:3)	15.45	23.70	43.02 ^c	91.80 ^b
Cowpea (1:2)	14.42	22.28	48.33 ^{bc}	93.92 ^b
Cowpea (1:3)	14.02	22.16	49.70 ^b	98.77 ^b
Soybean (1:2)	15.35	21.83	48.58 ^b	102.52 ^{ab}
Soybean (1:3)	14.77	26.10	51.33 ^b	99.08 ^b
Sole	13.50	22.87	47.83 ^{bc}	86.67 ^b
LS	NS	NS	**	**
SE (\pm)	0.77	1.58	1.76	6.05
Interaction				
V x C	NS	NS	NS	NS

Means followed by the same letter within the same column are not statistically different following DMRT. LS= Level of Significance, SE=Standard Error, **= significance at 0.01, *=significance at 0.05 and NS= Not Significant

Influence of Sorghum-Legume Intercropping on Number of Leaves of Sorghum

Effect of Sorghum-Legume intercrop on number of leaves of sorghum is presented in Table 3 and 4. The results showed that significant differences ($P \leq 0.05$) existed among the treatments used with respect to number of leaves. During the 2023 study, the result showed no significant ($P \leq 0.05$) effect in terms of variety throughout the study period. Cropping system on the other hand, intercropping one row of sorghum with two rows of cowpea significantly ($P \leq 0.05$) produced higher number of leaves at 8 and 10 WAS than the other row arrangements considered in the growing season. In 2024 study, except at 10 WAS where significant difference exists, no significant difference was observed in respect to variety throughout the study period. The result also indicated that, sorghum variety Sk-5912 significantly ($P \leq 0.05$) produced higher number of leaves than CRS-01. Cropping system on the other hand, intercropping one row of sorghum with two rows of Groundnut (1:2) significantly ($P \leq 0.05$) produced higher number of leaves at 6 and 10 WAS than the other row arrangements considered in the growing season. The non-significant varietal effect in 2023 study shows that cropping system design exerts stronger influence on sorghum growth than varietal differences. The number of leaves in sorghum-legume intercrop systems varies significantly depending on the legume used and the spatial arrangement. Studies have demonstrated that sorghum intercropped with cowpea enhances the number of leaves due to better nitrogen fixation and soil fertility improvement (Das *et al.*, 2023; Geren *et al.*, 2008).

Table 3: Influence of Sorghum-Legume Intercrop on Number of Leaves of Sorghum during 2023 Season

Treatments	Number of leaves			
	4WAS	6WAS	8WAS	10WAS
Variety (V)				
Sk-5912	4.33	7.67	9.79	11.62
CSR-01	4.07	6.76	9.03	10.95
LS	NS	NS	NS	NS
SE (±)	0.19	0.36	0.25	0.39
Cropping System (C)				
Groundnut (1:2)	4.42	8.50	9.18 ^{ab}	11.33 ^b
Groundnut (1:3)	4.17	7.17	10.50 ^a	12.00 ^{ab}
Cowpea (1:2)	4.17	8.00	10.50 ^a	13.00 ^a
Cowpea (1:3)	4.00	6.67	10.33 ^a	11.83 ^b
Soybean (1:2)	4.33	6.83	9.33 ^{ab}	10.83 ^{bc}
Soybean (1:3)	4.00	6.83	8.50 ^b	10.50 ^{bc}
Sole	4.33	6.50	7.50 ^c	9.50 ^c
LS	NS	NS	**	**
SE (±)	0.36	0.72	0.48	0.73
Interaction				
V x C	NS	NS	NS	NS

Means followed by the same letter within the same column are not statistically different following DMRT. LS= Level of Significance, SE=Standard Error, **= significance at 0.01, *=significance at 0.05 and NS= Not Significant

Table 4: Influence of Sorghum-Legume Intercrop on Number of Leaves of Sorghum during 2024 Season

Treatments	Number of leaves			
	4WAS	6WAS	8WAS	10WAS
Variety (V)				
Sk-5912	4.67	8.05	9.79	14.14 ^a
CSR-01	4.74	7.29	9.64	11.38 ^b
LS	NS	NS	NS	**
SE (±)	0.18	0.29	0.30	0.49
Cropping System (C)				
Groundnut (1:2)	4.25	9.83 ^a	9.67	12.33 ^a
Groundnut (1:3)	4.50	7.67 ^b	10.00	11.17 ^b
Cowpea (1:2)	4.83	8.33 ^{ab}	10.17	13.50 ^a
Cowpea (1:3)	4.67	7.67 ^b	9.83	13.00 ^a
Soybean (1:2)	4.67	7.66 ^b	9.33	12.33 ^a
Soybean (1:3)	5.00	7.16 ^b	9.17	11.50 ^a
Sole	5.01	5.33 ^c	9.83	8.50 ^b
LS	NS	**	NS	**
SE (±)	0.34	0.55	0.54	0.92
Interaction				
V x C	NS	NS	NS	NS

Means followed by the same letter within the same column are not statistically different following DMRT. LS= Level of Significance, SE=Standard Error, **= significance at 0.01, *=significance at 0.05 and NS= Not Significant

Effect of Sorghum-Legume Intercropping on Leaf Area of Sorghum

Effect of Sorghum-Legume Intercrop on Leaf Area of Sorghum is presented in Table 5 and 6. The results showed that significant ($P \leq 0.05$) differences existed among the treatments with respect to Leaf Area. During the 2023 study, the result showed no significant ($P \leq 0.05$) effect in terms of variety. Cropping system on the other hand, intercropping one row of sorghum and three rows of cowpea (1:3) significantly ($P \leq 0.05$) produced higher leaf area at 4 and 6 WAS while one row of sorghum and two rows of cowpea (1:2) significantly ($P \leq 0.05$) produced higher leaf area at 8 and 10 WAS. In 2024 study, the result showed no significant ($P \leq 0.05$) effect in terms of variety. Cropping system on the



other hand, intercropping one row of sorghum and 3 rows of cowpea (1:3) significantly ($P \leq 0.05$) had higher leaf area at 4 WAS than the other treatments used in the growing season. Intercropping sorghum with legumes such as cowpea has been shown to significantly influence leaf area development, with certain row ratios producing higher values due to improved resource utilization and reduced competition (Ahmad *et al.*, 2007; Iqbal *et al.*, 2016). For instance, cowpea intercropped at a 1:3 ratio resulted in higher leaf areas during early growth stages, aligning with findings from similar studies (Refay *et al.*, 2013). The non-significant varietal effect in study disagrees with the findings of Ghazanfar *et al.* (2013) who reported variations in leaf area due to varietal difference.

Table 5: Influence of Sorghum-Legume Intercrop on Leaf Area of Sorghum during 2023 Season

Leaf area				
Treatments	4WAS	6WAS	8WAS	10WAS
Variety (V)				
Sk-5912	137.81	314.40	319.33	393.90
CSR-01	103.90	325.25	329.33	380.24
LS	NS	NS	NS	NS
SE (\pm)	10.37	12.75	14.15	14.22
Cropping System (C)				
Groundnut (1:2)	122.50 ^{ab}	337.55 ^{ab}	313.53 ^b	425.52 ^{ab}
Groundnut (1:3)	141.10 ^{ab}	371.50 ^a	339.03 ^b	410.35 ^{ab}
Cowpea (1:2)	110.40 ^b	363.17 ^a	520.78 ^a	444.50 ^a
Cowpea (1:3)	177.42 ^a	352.97 ^a	339.62 ^b	384.32 ^{ab}
Soybean (1:2)	104.70 ^b	313.13 ^{ab}	432.23 ^{ab}	404.58 ^{ab}
Soybean (1:3)	98.38 ^b	235.07 ^c	271.50 ^c	344.35 ^b
Sole	91.50 ^b	265.38 ^{bc}	315.62 ^b	295.88 ^c
LS	**	**	**	**
SE (\pm)	19.41	23.85	25.89	26.59
Interaction				
V x C	NS	NS	NS	NS

Means followed by the same letter within the same column are not statistically different following DMRT. LS= Level of Significance, SE=Standard Error, **= significance at 0.01, *=significance at 0.05 and NS= Not Significant

Table 6: Influence of Sorghum-Legume Intercrop on Leaf Area of Sorghum during 2024 Season

Leaf area				
Treatments	4WAS	6WAS	8WAS	10WAS
Variety (V)				
Sk-5912	140.39	292.99	350.31	393.90
CSR-01	106.62	314.63	332.62	380.24
LS	NS	NS	NS	NS
SE (\pm)	9.88	12.97	21.37	14.22
Cropping System (C)				
Groundnut (1:2)	117.25 ^{bc}	322.40	374.42	383.67
Groundnut (1:3)	131.70 ^b	326.05	396.28	415.97
Cowpea (1:2)	112.58 ^{bc}	360.83	391.10	426.60
Cowpea (1:3)	211.87 ^a	348.10	338.90	389.83
Soybean (1:2)	106.73 ^b	327.30	328.18	401.77
Soybean (1:3)	100.02 ^c	346.53	286.97	376.58
Sole	84.40 ^d	310.33	274.47	326.62
LS	**	NS	NS	NS
SE (\pm)	18.49	24.27	39.97	40.97
Interaction				
V x C	NS	NS	NS	NS

Means followed by the same letter within the same column are not statistically different following DMRT. LS= Level of Significance, SE=Standard Error, **= significance at 0.01, *=significance at 0.05 and NS= Not Significant



Effect of Sorghum-Legume Intercrop on Panicle Length of Sorghum

Effect of Sorghum-Legume Intercrop on Panicle Length of Sorghum is presented in Table 7. The results showed that significant differences existed among the treatments with respect to Panicle Length. During the 2023 study, sorghum variety Sk-5912 significantly ($P \leq 0.05$) produced higher Panicle Length than variety CSR-01. Cropping system on the other hand, intercropping one row of sorghum and two rows of groundnut (1:2) significantly ($P \leq 0.05$) produced higher Panicle Length than all other treatments used in the study. In 2024 study, similarly, sorghum variety Sk-5912 significantly ($P \leq 0.05$) had higher Panicle Length than CSR-01 in the study. Cropping system on the other hand, growing one row of sorghum and two rows of groundnut (1:2) significantly ($P \leq 0.05$) outperformed all other cropping systems used in the study. The consistent superiority of Sk-5912 in both 2023 and 2024 studies is due to the fact that certain sorghum varieties exhibit inherent traits for improved reproductive growth under intercropping stress. The result is in conformity with Maman *et al.* (2017) who observed that intercropping sorghum with groundnut resulted in higher overall productivity compared to sole cropping, attributed to improved nutrient use efficiency.

Influence of Sorghum-Legume Intercrop on Panicle Weight of Sorghum

Effect of Sorghum-Legume Intercrop on Panicle Weight of Sorghum is presented in Table 7. The results showed that significant ($P \leq 0.05$) differences existed among the treatments with respect to 38 Panicle weight. During the 2023 study, sorghum variety Sk-5912 significantly ($P \leq 0.05$) produced higher Panicle weight than variety CSR-01. Cropping system on the other hand, intercropping one row of sorghum and two rows of Groundnut (1:2) significantly ($P \leq 0.05$) had higher Panicle weight than other treatments used. In 2024 study, similarly, sorghum variety Sk-5912 significantly ($P \leq 0.05$) had higher Panicle weight than variety CSR-01. Cropping system on the other hand, intercropping one row of sorghum and two rows of groundnut (1:2) significantly ($P \leq 0.05$) outperformed other cropping systems. The significant effect existed between the varieties indicate suitability for sorting out genotypes with superior grain weight. Ghazanfar *et al.* (2013) reported that a significant variability in seed index/grain weight is essential for the breeder to sort out genotypes with superior grain weight that result in higher grain yield. Sorghum-legume intercropping systems, such as sorghum-groundnut and sorghum-cowpea, have demonstrated significant yield advantages over sole cropping, with higher grain weights recorded under specific spatial arrangements (Egbe, 2010).

Table 7: Influence of Sorghum-Legume Intercropping on Panicle Length and Panicle Weight of Sorghum during 2023 and 2024 Season

Treatments	2023		2024	
	Panicle Length (g)	Panicle Weight (g)	Panicle Length(g)	Panicle Weight(g)
Variety (V)				
Sk-5912	25.25 ^a	48.49 ^a	24.86 ^a	47.88 ^a
CSR-01	20.93 ^b	43.08 ^b	21.01 ^b	43.85 ^b
LS	**	**	**	*
SE (±)	0.41	0.74	0.61	0.98
Cropping System (C)				
Groundnut (1:2)	26.65 ^a	50.03 ^a	25.77 ^a	50.50 ^a
Groundnut (1:3)	25.73 ^a	47.92 ^a	22.17 ^{ab}	46.95 ^b
Cowpea (1:2)	23.40 ^b	46.05 ^a	24.88 ^a	42.38 ^c
Cowpea (1:3)	21.85 ^b	46.37 ^{ab}	22.62 ^{ab}	47.00 ^b
Soybean (1:2)	22.93 ^b	46.40 ^b	22.72 ^{ab}	47.78 ^b
Soybean (1:3)	22.10 ^b	44.73 ^b	22.28 ^{ab}	44.95 ^c
Sole	18.95 ^c	39.00 ^c	20.10 ^c	41.50 ^d
LS	**	**	**	**
SE (±)	0.31	0.32	1.62	1.83
Interaction				
V x C	NS	NS	NS	NS

Means followed by the same letter within the same column are not statistically different following DMRT. LS= Level of Significance, SE=Standard Error, **= significance at 0.01, *=significance at 0.05 and NS= Not Significant

Effect of Sorghum-Legume Intercrop on 1000 Grain Weight of Sorghum

Effect of Sorghum-Legume Intercrop on 1000 Grain Weight of Sorghum is presented in Table 8. The results showed that significant ($P \leq 0.05$) differences existed among the treatments with respect to 1000 Grain Weight. During the 2023 study, sorghum variety Sk-5912 significantly ($P \leq 0.05$) performed better than variety CSR-01 in terms of 1000 Grain Weight. Cropping system on the other hand, intercropping one row of sorghum with two rows of groundnut (1:2) significantly ($P \leq 0.05$) produced higher 1000 Grain Weight than all other treatments used. In 2024 study, similarly, sorghum variety Sk-5912 significantly ($P \leq 0.05$) had 1000 Grain Weight than variety CSR-01. Cropping system on the other hand, intercropping one row of sorghum with two rows of groundnut (1:2) significantly ($P \leq 0.05$) outperformed other cropping systems. Variability existed between the varieties with respect to 1000 seed weight in all the years, indicating suitability for sorting out variety with superior grain weight. Ghazanfar *et al.* (2013) reported that a significant variability in seed index/grain weight is essential for sorting out genotypes with superior grain weight that result in higher grain yield. This contradicts the findings of Afe, *et al.*, (2024) who observed no significant difference in plant height, head length, and seed weight among the sorghum cultivars. The dominance of one row of sorghum and two rows of groundnut (1:2) cropping system mirrors Bala *et al.* (2021), who demonstrated that groundnut intercrops enhance soil nitrogen availability, directly boosting sorghum grain weight in Sokoto, Nigeria. Similarly, Adeyemo and Ojo (2019) highlighted that legume-based systems, particularly cowpea and groundnut, improve phosphorus mobilization—a critical factor for grain filling. Additionally, the suppression of *Striga* 41 hermonthica in intercropped systems, as noted by Oseni (2010) likely contributed to reduced parasitic stress on sorghum, further supporting grain weight improvements.

Influence of Sorghum-Legume Intercrop on Grain Yield of Sorghum

Effect of Sorghum-Legume Intercrop on Grain Yield of Sorghum is presented in Table 8. The results showed that significant ($P \leq 0.05$) differences existed among the treatments with respect to Grain Yield. During the 2023 study, sorghum variety Sk-5912 significantly ($P \leq 0.05$) performed better than variety CSR-01 in terms of Grain Yield. Cropping system on the other hand, intercropping one row of sorghum and two rows of groundnut (1:2) significantly ($P \leq 0.05$) had higher 1000 Grain

Weight than all other cropping systems used in the study. In 2024 study, similarly, sorghum variety Sk-5912 significantly ($P \leq 0.05$) had Grain Yield than CSR-01. Cropping system on the other hand, intercropping one row of sorghum and two rows of groundnut (1:2) significantly ($P \leq 0.05$) outperformed other cropping systems. Variety significantly the yield of sorghum per plot in the experiment. The reasons for the differences among the two varieties might be attributed to their inherent genotypic characteristics. Hargreaves *et al.* (2008). Intercropping sorghum with legumes such as cowpea and groundnut has been shown to improve yield, due to better resource utilization and reduced competition between crops (Gebremichael *et al.*, 2019) Studies indicate that sorghum intercropped with legumes such as groundnut and cowpea in a 1:2 or 1:3 arrangement significantly enhances grain yield and land productivity compared to sole cropping systems (Shehu *et al.*, 2015) 42 This is in conjunction with the findings of Afe *et al.*, 2021 who reported that Sorghum-legume intercropping has been shown to significantly influence grain yield, with sorghum-groundnut systems outperforming other combinations due to efficient resource utilization. The adoption of intercropping systems, particularly sorghum-groundnut and sorghum-soybean combinations, has demonstrated higher agronomic yield advantages and improved system productivity (Mohammed & Muhammad, 2015) The findings of the study contradict the findings of Afe *et al.*, (2024) who opined that the sole sorghum significantly out yielded the intercropped population ratios, presumably due to the absence of competition from companion crop.

Table 8: Influence of sorghum-Legume Intercropping on 1000Grain weight and Grain Yield per hectare of sorghum during 2023 and 2024 Season

Treatments	2023		2024	
	1000 Grain Weight (g)	Grain Yield (Kg/ha)	1000 Grain Weight (Kg)	Grain Yield (Kg/ha)
Variety (V)				
Sk-5912	22.01 ^a	3340.19 ^a	21.71 ^a	3387.33 ^a
CSR-01	18.90 ^b	2820.22 ^b	18.47 ^b	2856.65 ^b
LS	**	**	**	**
SE (\pm)	0.29	2692.18	0.42	71.16
Cropping System (C)				
Groundnut (1:2)	22.51 ^a	3457.45 ^a	21.67	3554.13 ^a
Groundnut (1:3)	21.48 ^{ab}	3313.55 ^{ab}	20.55	3183.98 ^{ab}
Cowpea (1:2)	19.56 ^c	3119.35 ^{ab}	19.89	3171.16 ^{ab}
Cowpea (1:3)	20.31 ^b	3010.38 ^b	20.28	3078.68 ^b
Soybean (1:2)	19.69 ^c	3015.45 ^b	18.71	3017.12 ^b
Soybean (1:3)	20.65 ^b	3057.53 ^b	19.32	3077.31 ^b
Sole	18.99 ^c	2587.70 ^c	19.20	2771.56 ^c
LS	**	**	NS	**
SE (\pm)	0.55	116.33	0.78	133.13
Interaction				
V x C	**	**	NS	NS

Means followed by the same letter within the same column are not statistically different following DMRT. LS= Level of Significance, SE=Standard Error, **= significance at 0.01, *=significance at 0.05 and NS= Not Significant

Effect of Sorghum-Legume Intercrop on Number of *Striga* per Plot

Effect of Sorghum-Legume Intercrop on number of *Striga* per plot is presented in Table 9. The results showed that significant ($P \leq 0.05$) differences existed among the treatments with respect to Number of *Striga* per Plot. During the 2023 study, the result showed no significant ($P \leq 0.05$) effect in terms of variety as well as the Cropping system at both growth and yielding stage. In 2024 study, sorghum variety Sk-5912 significantly ($P \leq 0.05$) had a smaller number of *Striga* than variety CSR-01. Cropping system on the other hand, intercropping one row of sorghum with two rows of groundnut (1:2) significantly ($P \leq 0.05$) had a smaller number of *Striga* than other treatments used. This was in agreement with the findings of Fasil and Verkleij (2007) who found that higher *Striga* shoots per plant

were recorded in soybean-sorghum intercropping than in cowpea intercropped with sorghum. Furthermore, even some varieties were more effective than others and effectiveness is known to vary across *S. hermonthica* populations (Fasil and Wondimu, 2001). The significant difference observed is in agreement with the findings of Aliyu and Emechebe (2006) who reported higher number of *Striga* in sole sorghum as compared to sorghum was intercropped with cowpea. Similarly, by Fasil and Verkleij (2007) indicated higher *Striga* count in sole sorghum than sole soybean, sole cowpea and sole haricot bean. Khan *et al.* (2011) also reported that weed population was significantly affected by intercropping both mungbean and 47 soybean in one-one and two-two rows simultaneously seeded or delayed seeded by three weeks. Zeyaur *et al.* (2006) reported that *S. hermonthica* counts were significantly lower in the sorghum/ *Desmodium intortum* intercropping, than in sorghum monocrops. In contrast, Fasil and Verkleij (2007) reported that cowpea; soybean and haricot bean planting in sorghum did not significantly influence *Striga* count per plant. The contrasting results might be due to varietal and environmental differences at the locations.

Table 9: Influence of Sorghum-Legume Intercrop on Number of *Striga* per Plot in 2023 and 2024 Seasons

Yielding Treatments	2023		2024	
	Growth	Yielding	Growth	
	Stage	Stage	Stage	Stage
Variety (V)				
Sk-5912	3.19	4.61	3.11 ^a	5.13 ^a
CSR-01	3.45	4.58	3.83 ^b	5.69 ^b
LS	NS	NS	**	*
SE (±)	0.17	0.21	0.16	0.25
Cropping System (C)				
Groundnut (1:2)	3.37	3.17 ^a	2.68 ^a	3.12 ^a
Groundnut (1:3)	3.66	4.40 ^b	3.66 ^b	5.97 ^b
Cowpea (1:2)	3.21	4.78 ^{bc}	3.21 ^{ab}	5.25 ^b
Cowpea (1:3)	3.10	4.78 ^{bc}	3.10 ^{ab}	4.97 ^b
Soybean (1:2)	3.20	5.10 ^{bc}	3.20 ^{ab}	5.27 ^b
Soybean (1:3)	3.18	4.93 ^b	3.18 ^b	5.50 ^b
Sole	3.52	6.02 ^c	5.27 ^c	7.87 ^c
LS	NS	**	**	**
SE (±)	0.21	0.39	0.29	0.46
Interaction				
V x C	NS	NS	NS	NS

Means followed by the same letter within the same column are not statistically different following DMRT. LS= Level of Significance, SE=Standard Error, **= significance at 0.01, *=significance at 0.05 and NS= Not Significant

CONCLUSION AND RECOMMENDATIONS

The study concluded that variety and Intercropping have significant influence on the productivity of sorghum and *Striga* severity in the study area. Therefore, Sorghum Variety Sk-5912 (SAMSORG-17) Intercrop with Legume such as Groundnut (*Arachis hypogea*) is recommended for increased productivity of sorghum in the study area. Trials with other varieties and legumes in different ratios is also recommended.

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