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REACTION OF HOST CROP GENOTYPES TO *Striga hermonthica* AT BIDA, MOKWA AND SHONGA IN THE NIGERIAN GUINEA SAVANNA

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ABSTRACT

Field trials were conducted on the farms of Niger State College of Agriculture, Mokwa (09^{0}18^{1}N; 05^{0}04^{1}E), National Cereals Research Institute Bida (09^{0}45^{1}N; 06^{0} 07^{1}E) and Emir of Shonga (08^{0}29^{1}N; 04^{0} 35^{1}E) in 2004, 2005 and 2006 wet seasons trials to the effect of Striga hermonthica 0n the performance of three genotypes each of three host crops, The genotypes were 9022-13, Acr. 97 TZL Comp. 1-W and 8338- 1 for maize, FARO 40, WAB 56- 50 and FARO 45 for rice and SAMSORG 3, ICSV 111 and SAMSORG 1 for sorghum with and without *Striga* infestation. constituted the treatments were laid out in a randomized complete block design replicated four times. The results indicated that the genotypes of maize (9022-13 and Acr. 97 TZL Comp.1-W), rice (FARO 40 and WAB 56-50) and sorghum (SAMSORG 3) exhibited various levels of resistance/ tolerance to Striga parasitism through support for lower infestation and incidence of the weed, exhibition of lower reaction syndrome and higher crop growth vigour as well as production of higher grain yield than the other respective varieties. Parasitism of host crops followed the order Mokwa > Bida > Shonga at different locations in the trial.

KEY WORDS: *Striga hermonthica*, host crop genotypes, maize, rice, sorghum

Striga hermonthica is an obligate root parasite that depends on the chemical stimuli of the host for seed germination and subsequent development of the seedlings (Doggett, 1970, Kim, 1994; Isah, 2008; Shambe et al., 1996). It draws its water, nutrient and some of the manufactured food from the host and adversely affects the physiology of the host by producing toxic materials and disrupting the distribution of hormones. These host crops include maize, sorghum, millet, upland rice, acha, sugarcane, and other weeds such as *Paspalum spp*, *Digitaria singularis*, *Rottboellia cochinensis* and others (Butler, 1995; Isah, 2008; Johnson et al., 1997; Kim, 1994). It occurs on 86% of the cultivated land in the Nigerian Savanna and parasitizes all of the cultivated cereal food crops in the Savanna ecological zones (Isah, 2008; Lagoke et al., 1999). In Nigeria, it has been reported to cause 10-100 % cereal loss depending on the incidence, level of infestation and distribution of the parasitic weed, the crop variety, location and cultural practice in use (Lagoke et al., 1999; Doggett, 1970). A severe infestation can result in complete loss of the crop and abandonment of otherwise productive fields (Berner et al., 1995; Isah, 2008). There is no single effective and economically feasible *Striga* control method available to the small scale African farmers (Adagba, 2000; Isah et al., 2009). The control methods identified include land preparation, hand pulling and hoe-weeding, use of trap and catch crop, use of nitrogen fertilizer, seed treatment, chemical stimulants, biological control, herbicide application and the use of resistant varieties. Of all these host plant resistance has been considered the most important, durable, inexpensive, cost effective and easily adoptable method (Adagba et al., 2003; Berner et al., 1995; Bontanga et al., 2002, Efron, et al., 1998; Isah, 2002). However, the use of host plant resistance has problems of lack of universal resistance in crop genotypes due to existence of different *Striga* biotypes (Gupta and Lagoke, 1999; Koyama, 2000; Ramaiah, 1987). *Striga hermonthica* is cross pollinated (allogamous) plant and thus generate a great amount of variability through genetic recombination, making improvement of host resistance against the weed a difficult task (Adagba, 2000; Berner et al., 1995; Bontanga et al., 2002 Gupta and Lagoke, 1999). In the study of *Striga hermonthica* populations from West and East Africa using isoenzyme and RAPD analysis, Koyama (2000) observed significant variation within and between the populations. Similar observation was made in Nigeria where Mokwa and Lafia *Striga* ecotypes were more related in parasitism on rice genotypes and caused higher effect on

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the crop than to Bida ecotype which also caused higher rice damage than that of Zaria and Kano which were more related on their parasitism on the crop (Adagba, 2002; Gupta and lagoke, 1999; Isah, 2002, 2008; Isah et al., 2009)

The objective of the study therefore was to evaluate the reactions of three genotypes each of three host crops maize (9022-13, Acr. 97 TZL Comp. 1-W and 8338-1), rice (FARO 40, WAB 56- 50 and FARO 45) and sorghum (SAMSORG 3, ICSV 111 and SAMSORG 14) to *Striga hermonthica* parasitism at different locations (Mokwa, Bida and Shonga)

MATERIALS AND METHODS

The trials were conducted on the crop fields at Niger State College of Agriculture, Mokwa (09° 18'N and 05° 04'E), National Cereal Research Institute Bida (09° 45'N and 06° 07'E) and Emirs farm Shonga (08° 29'N and 04° 35'E) during 2004, 2005 and 2006 wet seasons. Mokwa, Bida and Shonga are respectively located in the Southern Guinea, Northern Guinea and Derived Guinea Savanna agro-ecological zones of Nigeria. The trials were laid out in a Randomised Complete Block Design (RCBD) consisted of eighteen treatments viz; three varieties each of maize(Acr. 97 TZL Comp. 1-W, 9022-13 and 8338-1), rice (FARO 40, WAB 56-50 and FARO 45) and sorghum(ICSV 111, SAMSORG 3 and SAMSORG 14) infested with *Striga* seeds as well as their respective *Striga* free controls. All the treatments are replicated four times. Each plot consisted of 8 ridges at 4m long and data are collected from the 4 inner ridges thus the gross and net plot sizes were $24m^2$ and $12m^2$ respectively. Land preparation was properly done, three seeds of maize, five seeds of sorghum and seven seeds of rice were planted per hill and thinned down to two at 2 weeks after planting(WAP) for maize and at 5 WAP for sorghum. Rice was thinned down to four per hill at 5 WAP. The intra-row spacing of 50cm was maintained for maize and sorghum and 25cm for rice. Fertilizer at the rates of 120 kg N /ha, 60 kg P_2O_5 /ha and 60kg K_2O /ha was applied to maize and sorghum and 80 kg N /ha, 40 kg P_2O_5 /ha and 40 kg K_2O /ha was applied to rice. Half the rate of nitrogen and the complete rate of phosphorus and potassium was applied at 3 WAP using compound fertilizer N P K 15-15-15 while the other half of nitrogen was applied at 6 WAP using urea. Each plot was hoe-weeded at 2 and 5 WAP. Thereafter weeds other than *Striga* were hand pulled. The parameters collected include plant height at 9 and 12WAP, crop vigour score and reaction score at 9 and 12 WAP. Number of days to first *Striga* emergence, *Striga* shoot count and incidence at 9 and 12WAP as well as cereal grain yield (kg /ha). All the data collected were subjected to analysis of variance (ANOVA) and means separated using Duncan Multiple Range Test (Gomez and Gomez; 1984).

RESULTS

Striga infestation significantly depressed plant height of maize hybrid 8338-1 and open pollinated variety (OPV) Acr. 97 TZL Comp.1-W and the three sorghum varieties SAMSORG 3, SAMSORG 14 and ICSV 111 in the three years at 9 and 12WAP. Also, under *Striga* infestation, the height of the three rice varieties FARO 40, WAB 56-50 and FARO 45 were significantly shorter compared with their respective controls in the three years at 9WAP and in 2004 at 12WAP. In addition, the plant height of rice varieties FARO 45 and WAB 56-50 under *Striga* infestation were significantly shorter compared with their respective controls at 12 WAP in 2005 and 2006 (Table 1). The height of the host crops were significantly shorter at Mokwa than at Shonga location in the three years at 9 and 12 WAP. Similarly, host crop plants height were shorter at Bida at 12 WAP in 2006 and 9 WAP in 2004 compared with those at Shonga while they were taller than those of Mokwa location (Table 1).

Strga infestation significantly depressed the growth vigour of maize hybrid 8338-1 and OPV Acr. 97 TZL Comp.1-W at 9 and 12 WAP in 2004 and at 12 WAP in 2005 as well as all the three maize genotypes at 9 WAP in 2005 and at 9 and 12 WAP in 2006 compared with their respective controls. *Striga* infestation did not have significant effect on the vigour of plants of rice var. FARO 40 at 9 WAP in 2005 and 12 WAP in 2004 as well as WAB 56-50 at 9 WAP in 2005. In all other cases, vigour score of crop plants were significantly depressed. The three sorghum varieties under *Striga* infestation at 12 WAP in the three years and 9 WAP in 2006 as well as SAMSORG 3 and ICSV

111 at 9 WAP in 2004 and 2005 had significantly higher vigour score compared with their respective controls. In all the trials, maize varieties 9022-13 and Acr. 97 TZL Comp.1-W, rice varieties FARO 40 and WAB 56-50 as well as sorghum var. SAMSORG 3 had significantly higher vigour score compared with their other corresponding varieties 8338-1 for maize, FARO 45 for rice and ICSV 111 and SAMSORG 14 for sorghum. It is also cleared that maize var. 9022-13 and rice var. FARO 40 had significantly higher vigour score than maize Acr. 97 TZL Comp.1-W and rice WAB 56-50 respectively (Table 2). The significant effect of *Striga* parasitism on the vigour score of the host crops at various locations followed the order Mokwa > Bida.> Shonga (Table 2)

Maize hybrid, 8338-1 in all cases and Acr. 97 TZL Comp.1-W at 9 WAP in 2004 and at 12 WAP in the three years exhibited significantly higher reaction syndrome to *Striga* parasitism compared with their respective controls. The two rice varieties WAB 56-50 and FARO 45 and sorghum varieties ICSV 111 and SAMSORG 14 exhibited significantly higher reaction syndrome to *Striga* parasitism than their respective controls at 9 and 12 WAP in the three years, it is only so, with SAMSORG 3 at 9 WAP in 2004 and 2006 and at 12 WAP in the three years. In all the trials, under *Striga* infestation the STR maize and rice genotypes as well as sorghum var. SAMSORG 3 had significantly lower crop reaction scores than their corresponding varieties 8338-1 for maize, FARO 45 for rice as well as ICSV 111 and SAMSORG 14 for sorghum (Table 3). The host crop reaction syndrome at different locations followed the order Mokwa > Bida > Shonga (Table 3).

Maize var. Acr. 97 TZL Comp.1-W in 2004, the same variety with hybrid 9022-13 in 2005 supported earlier emergence of *Striga* than 8338-1. However, in 2006, the number of days to first *Striga* emergence followed the order 9022-13 > Acr. 97 TZL Comp.1-W > 8338-1. In the three years, *Striga* emergence was significantly delayed on FARO 40 compared with the other rice varieties while significant delayed emergence was observed with WAB 56-50 compared with FARO 45 in 2004 and 2005. Also, the emergence of *Striga* shoot on sorghum var. SAMSORG 3 was significantly delayed compared with ICSV 111 in the three years and SAMSORG 14 in 2006. The delayed emergence at various locations is in the order Shonga > Bida > Mokwa (Table 4).

Striga shoot count on maize genotypes followed the order Acr. 97 TZL Comp.1-W < 9022-13 < 8338-1 except at 12WAP in 2004 and 2005 when Acr. 97 TZL Comp.1-W and 9022-13 supported similar number of *Striga* shoots. Similarly *Striga* shoot emergence on rice varieties followed the order FARO 40 < WAB 56-50 < FARO 45 except at 12 WAP in 2005 when WAB 56-50 had *Striga* shoot counts comparable to those of FARO 45. Number of *Striga* that emerged on sorghum varieties followed the order SAMSORG 3 < ICSV 111 <SAMSORG 14. At the three locations, the number of *Striga* shoots significantly followed the order Mokwa > Bida > Shonga (Table 4).

The tolerant maize varieties 9022-13 and Acr. 97 TZL Comp.1-W, rice var. FARO 40 and sorghum var. SAMSORG 3 had significantly lower *Striga* incidence compared with their other corresponding varieties 8338-1 for maize, WAB 56-50 and FARO 45 for rice and ICSV 111 and SAMSORG 14 for sorghum at 9 and 12 WAP in the three years. Furthermore, maize var. Acr. 97 TZL Comp.1-W had lower *Striga* incidence than 9022-13 at 9 WAP in the three years and at 12 WAP in 2004. Also, rice var. WAB 56-50 had significantly lower *Striga* incidence than rice var. FARO 45 at 9 WAP in 2005 and 2006 and at 12 WAP in 2004. In addition, sorghum var. ICSV111 had significantly lower *Striga* incidence compared with SAMSORG 14 at 9 and 12 WAP in the three years. The effect of location on *Striga* incidence on host crops was significant following the order Mokwa > Bida > Shonga at 9 and 12 WAP in the three years (Table 5).

Striga infestation significantly depressed the grain yields of the three genotypes each of maize and rice and sorghum varieties ICSV 111 and SAMSORG 14 in the three years compared with their respective *Striga* free controls. Under *Striga* infestation, the tolerant maize varieties 9022-13 and Acr. 97 TZL Comp.1-W and rice varieties FARO 40 and WAB 56-50 produced significantly higher grain yields than the susceptible maize var. 8338-1 and rice var. FARO 45 respectively. In the three years, the host crops grain yield at Mokwa was significantly lower than at Bida and Shonga. Furthermore, the grain yield of the host crops at Bida was significantly lower than at Shonga location in the three years (Table 5).

DISCUSSION

Maize genotypes 9022-13 and Acr.97 TZL Comp.1-W, rice varieties FARO 40 and WAB 56-50 and sorghum var. SAMSORG 3 exhibited more acceptable growth performance viz; lower plant height reduction and crop reaction syndrome to *Striga*, higher crop vigour score and grain yield compared to the other corresponding varieties viz; 8338-1 for maize, FARO 45 for rice and ICSV111 and SAMSORG 14 for sorghum. The results confirmed that the maize genotypes 9022-13 and Acr.97 TZL Comp.1-W, rice varieties FARO 40 and WAB 56 -50 as well as sorghum var. SAMSORG 3 exhibited different forms and levels of resistance to *Striga hermonthica* (Adagba, 2000; Isah, 2002 Isah et al., 2009) had earlier reported yield losses of 77..4% in 8338-1, 52.5% in 9022-13 and 30.5% in Acr. 97 TZL Comp.l-W, the precursor of Acr.97 TZL Comp.l-W. Isah et al., (2009) reported that the yield of 9022-13 and Acr. 97 TZL Comp.l-W were higher than that of 8338 -1 by 1.9 and 1.5 respectively in the trials conducted at Mokwa and Bida. Isah (2002) had earlier attributed the tolerance to *Striga* in the maize genotypes to multiple genes (horizontal resistance). Earlier reports have confirmed that rice varieties FARO 40 and WAB 50 -50 exhibited high and moderate levels of resistance to *Striga hermonthica* (Adagba, 2000; Adagba et al., 2002, 2003) Even though other varieties have also been reported, they have been less consistent in the exhibition of STR features compared to FARO 40 and WAB 56-50. Generally, resistance to *Striga* in sorghum has been associated with low productivity. Many are also drought tolerant and adapted to low yielding potential of the drier Sudan savanna and Sahel agro ecology, this may be the reason for low yield obtained from sorghum var. ICSV111 in this study. However, many land races have developed tolerance over time, .these include the Bauchi early selection (BES) now SAMSORG 3, Kano farafara. The varieties exhibited low reaction to *Striga* parasitism and produced higher grain yield inspite support for moderate to high *Striga* emergence. In this study also, the result has consistently shown that host crop genotypes planted at Mokwa location had higher *Striga* shoot count and damage syndrome with resultant lower grain yield than at Bida and Shonga locations. Furthermore, higher level of parasitism was exhibited at Bida compared to Shonga location which also had higher host crop grain yield. Since the trend observed was similar for all the varieties of the host crops evaluated, it is apparent that the differential level of *Striga* parasitism on the host crops at the three locations is mainly due to ecotypic strain variation in the species. Lagoke et al., (1991) suggested the existence of physiological strains of *S. hermonthica* in East Africa where it was observed that varieties of sorghum resistant at one location became susceptible at another. Similar observations were made by Lagoke et al., (1997) following his studies of *S. hermonthica* in West Africa.

CONCLUSION

It is obvious in this study that maize genotypes Acr. 97 TZL Comp.1- W and 9022- 13, rice varieties FARO 40 and WAB 56- 50 and sorghum var. SAMSORG 3 are resistant/ tolerant to *Striga hermonthica* parasitism. It is evidenced that variation of *Striga hermonthica* strains also exist within the Guinea Savanna of Nigeria as shown in this study.

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Table 1: Maize, rice and sorghum height (cm) at Mokwa, Bida and Shonga 2004, 2005and2006 wet seasons

Treatments	Host crop genotypes height (cm)					
	9WAP			12WAP		
	2004	2005	2006	2004	2005	2006
Host Crop Genotypes (H)						
Maize Crop						
Infested	150.3b[1]	145.3b	150.1b	152.5b	159.6b	157.1b
Acr.97 TZL Comp. 1-W	115.bc	121.2c	126.7c	125.8c	127.0de	130.0d
9022-13	93.7c	103.6c	106.3e	113.7d	122.0e	125.0d
8338-1	159.7a	158.7a	160.2a	169.7a	170.1a	171.0a
No Infestation	115.8c	122.6c	127.3c	126.1c	129.9d	130.d
Acr. 97 TZL Comp. 1 W	103.8d	114.1d	115.9d	131.7c	150.2c	140.3c
9022-13	2.75	3.30	2.91	3.44	2.30	3.02
8338-1						
SE±	24.7b	25.6b	27.7b	30.7c	39.2b	39.7b
Rice Crop	26.8b	26.0b	28.2b	35.8b	38.4b	38.1b
Infested	24.1b	26.4b	27.1b	31.8c	30.8c	31.2c
FARO 40	29.8a	30.1a	33.6a	39.7b	42.4b	43.7b
WAB 56-50	31.5a	32.3a	37.2a	45.8a	49.9a	52.7a
FARO 40	30.7a	31.1a	37.4a	44.2b	45.7a	50.6a
No Infestation	1.03	1.21	1.32	1.32	1.51	2.01
FARO 40	113.1d	103.4d	116.3d	111.2d	118.3d	125.3d
WAB 56-50	117.1cd	123.2c	125.1c	129.2c	132.1c	134.0c
FARO 40	133.3b	138.3b	141.2b	141.3b	143.2b	150.3b
SE±	120.1c	129.7b	130.1c	124.7c	128.7c	137.2c
Sorghum Crop	139.7b	145.2a	142.0b	148.3b	149.7b	150.2b
Infested	152.7a	159.7a	167.7a	161.8a	169.7a	173.3a
SAMSORG 3	2.24	2.01	2.32	2.75	2.26	3.06
ICSV111	89.3c	99.7b	103.1c	103.7b	112.1b	116.1c
SAMSORG 14	96.2b	102.3ab	121.2c	149.3ab	114.3ab	131.1b
No Infestation	104.1a	106.9a	129.9a	106.9a	120.1a	139.1a
SAMSORG 3	2.23	2.21	2.26	2.37	2.25	2.30
ICSV111	NS	2.11*	2.03*	2.17*	2.29*	2.41*
SAMSORG 14	17.62	18.64	16.23	17.93	6.65	8.21

1-Means followed by same letter(s) within a column are no significantly different at 5% probability (DMRT)
WAP Weeks after planting
* - Significant at 5% probability (DMRT)
NS - Not significant at 5% probability (DMRT)

Table 2: Effect of *Striga* infestation on vigour score of maize, rice and sorghum varieties at Mokwa, Bida and Shonga 2004, 2005 and 2006 wet seasons

Treatments	Host crop genotypes height (cm)					
	9WAP			12WAP		
	2004	2005	2006	2004	2005	2006
Host Crop Genotypes (H)						
Maize Crop						
Infested	4.0b[1]	4.7b	4.3b	3.7b	4.0b	4.0b
Acr.97 TZL Comp. 1-W	5.0a	4.7b	4.3b	4.3b	4.7a	4.0b
9022-13	3.0c	3.3c	2.3c	2.3c	3.0c	1.7c
8338-1	5.0a	4.9a	4.9a	4.9a	4.8a	4.9a
No Infestation	4.9a	4.9a	4.9a	4.9a	4.9a	4.8a
Acr. 97 TZL Comp. 1-W	4.9a	5.0a	4.9a	4.9a	4.9a	4.9a
9022-13	0.10	0.05	0.17	0.15	0.19	0.13
8338 – 1						
SE±	4.6a	5.0a	4.6b	4.7ab	5.0a	4.3b
Rice Crop	4.3c	4.7ab	4.3c	4.2bc	4.7a	4.1c
Infested	4.0d	4.3b	4.0d	3.7c	4.0b	3.7d
FARO 40	5.0a	4.9a	4.9a	5.0a	4.9a	4.9a
WAB 56-50	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
FARO 40	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
No Infestation	0.07	0.18	0.09	0.22	0.21	0.08
FARO 40	4.3b	4.0b	4.0b	4.0b	4.0b	4.0b
WAB 56-50	3.7c	3.7b	3.3c	3.0c	2.7c	3.0c
FARO 40	4.7a	4.7a	3.3c	4.1b	4.0b	3.0c
SE±	4.9a	4.8a	4.8a	4.9a	4.8a	4.7a
Sorghum Crop	4.9a	4.9a	5.0a	4.9a	4.8a	4.9a
Infested	5.0a	4.8a	4.8a	4.9a	4.7a	4.8a
SAMSORG 3	0.11	0.13	0.08	0.21	0.27	0.20
ICSV111	3.7c	3.7c	3.7c	2.9c	3.3c	2.0c
SAMSORG 14	4.3b	4.4b	4.3b	3.7b	2.9b	2.7b
No Infestation	4.7a	4.7a	4.7a	4.3a	4.2a	4.0a
SAMSORG 3	0.11	0.09	0.07	0.07	0.03	0.17
ICSV111	0.10*	0.17*	0.20*	0.19*	0.18*	NS
SAMSORG 14	3.72	5.71	3.83	10.30	11.41	10.33

1 - Means followed by same letter(s) within a column are no significantly different at 5% probability (DMRT)

WAP Weeks after planting

* - Significant at 5% probability (DMRT)

NS - Not significant at 5% probability (DMRT)

Note: 1 not vigorous while 5 very vigorous

Table 3: Maize, rice and sorghum reaction scores at Mokwa, Bida and Shonga 2004, 2005 and 2006 wet seasons

Treatments	Host crop genotypes' reaction score					
	9WAP			12WAP		
	2004	2005	2006	2004	2005	2006
Host Crop Genotypes (H)						
Maize Crop						
Infested	1.7b[1]	1.1b	1.7b	2.3b	2.3b	2.7b
Acr.97 TZL Comp. 1-W	1.0c	1.0b	1.3c	1.3c	1.3c	1.7c
9022-13	3.3a	1.3a	3.7a	4.7a	4.7a	5.0a
8338-1	1.0c	1.0b	1.0d	1.1c	1.1c	1.2d
No Infestation	1.0c	1.0b	1.1d	1.0c	1.2c	1.1d
Acr. 97 TZL Comp. 1-W	1.2c	1.0b	1.0d	1.2c	1.0c	1.1d
9022-13	0.10	0.02	0.04	0.17	0.17	0.11
8338 – 1						
SE±	1.3b	1.0c	1.0c	1.3c	1.3c	1.7c
Rice Crop	1.3b	1.3b	1.7b	1.7b	1.7b	2.3b
Infested	1.7a	2.0a	2.3a	3.0a	3.0a	3.3a
FARO 40	1.0c	1.0c	1.0c	1.2c	1.0c	1.1d
WAB 56-50	1.0c	1.0c	1.1c	1.0c	1.1c	1.2d
FARO 40	1.0c	1.0c	1.1c	1.1c	1.2c	1.1d
No Infestation	0.02	0.03	0.04	0.09	0.09	0.07
FARO 40	1.3c	1.0b	1.7b	2.7b	2.7b	3.0c
WAB 56-50	2.7a	2.0a	3.3a	4.3a	4.3a	5.0a
FARO 40	2.0b	1.7a	3.0a	3.3b	3.3b	4.0b
SE±	1.0d	1.1b	1.0c	1.2c	1.0c	1.2d
Sorghum Crop	1.0d	1.1b	1.1c	1.0c	1.1c	1.1d
Infested	1.0d	1.5b	1.0c	1.1c	1.1c	1.0d
SAMSORG 3	0.08	0.12	0.10	0.23	0.23	0.10
ICSV111	2.1a	2.1a	3.0a	3.7a	4.1a	5.3a
SAMSORG 14	1.7b	2.3a	2.7b	2.3b	2.7b	4.0b
No Infestation	1.3c	2.0a	2.3c	2.0c	2.3c	3.3c
SAMSORG 3	0.10	0.07	0.08	0.07	0.09	0.11
ICSV111	0.04*	0.02*	0.05*	0.09*	0.09*	NS
SAMSORG 14	13.11	16.22	13.71	12.83	19.31	21.33

1 - Means followed by same letter(s) within a column are no significantly different at 5% probability (DMRT)

WAP Weeks after planting

* - Significant at 5% probability (DMRT)

NS - Not significant at 5% probability (DMRT)

Note: Crop reaction score ranges between 1 to 9, where 1 is assigned to no chlorosis, no blotching and no leaf scorching (firing) and normal plant growth and 9 complete leaf scorching of all leaves causing pre-mature death of host plant and no ear formation.

Table 4: Number of days to first emergence and shoot count of *Striga hermonthica on* maize, rice and sorghum varieties at Mokwa, Bida and Shonga 2004, 2005 and 2006 wet seasons

Treatments	Number of days to first emergence			*Striga* shoot count/$12m^2$					
				9WAP			12WAP		
	2004	2005	2006	2004	2005	2006	2004	2005	2006
Host Crop Genotypes (H)									
Maize Crop									
Infested	44.3b[1]	45.0c	44.1b	6.0c	4.3c	6.7c	8.3b	8.0b	10.1c
Acr.97 TZL Comp. 1-W	45.2ab	46.1b	45.7a	8.7b	6.7b	9.3b	10.1b	9.0b	12.3b
9022-13	46.0a	47.2a	42.0a	13.3a	10.2a	15.1a	15.7a	13.7a	10.3a
8338-1	0.37	0.29	0.30	0.42	0.21	0.31	0.36	0.34	0.40
No Infestation									
SE±	55.2a	60.3a	54.3a	0.0c	1.3c	1.5c	1.3c	1.3b	1.7c
Rice Crop	50.4b	58.7b	47.3b	1.0b	2.0b	2.3b	2.7b	2.7a	3.3b
Infested	47.7c	52.4c	46.3b	1.7a	3.0a	3.7a	3.3a	3.0a	4.3a
FARO 40	0.30	0.41	0.43	0.06	0.07	0.10	0.05	0.12	0.33
WAB 56-50	44.0a	46.8a	43.8a	3.7c	3.0c	3.7c	4.0c	3.7c	6.7c
FARO 40	40.3b	42.1b	41.2b	10.3b	7.3b	8.7b	10.1b	9.5b	13.7b
No Infestation	42.7ab	43.9ab	41.3b	14.7a	8.4a	12.3a	16.7a	12.6a	17.3a
SE±	1.07	1.42	0.44	0.12	0.11	0.37	0.26	0.15	0.40
Sorghum Crop	40.1c	41.3c	40.0c	13.1a	10.3a	12.1a	14.1a	11.31a	18.1a
Infested	45.3b	46.9b	43.9b	7.3b	6.7b	10.0b	8.0b	7.1b	13.3b
SAMSORG 3	50.1a	53.7a	47.8a	5.4c	3.0c	4.3c	5.7c	3.8c	9.7c
ICSV111	1.33	1.71	1.21	0.19	0.21	0.40	0.33	0.42	0.57
SAMSORG 14	NS	NS	NS	0.09*	0.10*	0.11*	0.03*	0.12*	0.30*
No Infestation	19.31	28.73	28.83	46.71	30.11	26.27	31.23	26.13	24.73

1 - Means followed by same letter(s) within a column are no significantly different at 5% probability (DMRT)

* - Significant at 5% probability (DMRT)

NS - Not significant at 5% probability (DMRT)

WAP Weeks after planting

Table 5: *Striga* incidence and grain yield (kg/ha) of maize, rice and sorghum varieties at Mokwa, Bida and Shonga in 2004, 2005 and 2006 wet seasons

Treatments	*Striga* incidence						Grain yield kg/ha at harvest		
	9WAP			12WAP					
	2004	2005	2006	2004	2005	2006	2004	2005	2006
Host Crop Genotypes (H)									
Maize Crop									
Infested	5.0c[1]	3.3c	3.7c	6.3c	5.7b	5.3b	2100c	2280b	2177b
Acr.97 TZL Comp. 1-W	7.3b	5.3b	4.7b	9.2b	6.7b	6.0b	2788c	2965b	2813b
9022-13	12.0a	9.3a	6.1a	12.3a	10.3a	7.3a	989d	1003c	991c
8338-1	-	-	-	-	-	-	3022b	4041a	3850a
No Infestation	-	-	-	-	-	-	3818a	4115a	4133a
Acr. 97 TZL Comp. 1-W	-	-	-	-	-	-	3008b	4101a	3818a
9022-13	0.21	0.17	0.12	0.34	0.39	0.15	206.1	284.3	302.4
8338 – 1									
SE±	0.0b	1.0c	1.1c	1.0c	1.3c	1.2b	2030b	2243b	2241b
Rice Crop	0.7a	1.7b	8.7b	2.0c	2.3a	2.0a	1985b	2240b	2118b
Infested	0.7a	2.3a	2.0a	3.3a	2.7a	2.3a	1013c	1132c	1099c
FARO 40	-	-	-	-	-	-	2618a	2815a	2742b
WAB 56-50	-	-	-	-	-	-	2522a	2816a	2738a
FARO 40	-	-	-	-	-	-	2424a	2826a	2738a
No Infestation	0.05	0.10	0.12	0.05	0.16	0.13	133.2	168.4	183.8
FARO 40	2.7c	3.0c	2.7c	4.1c	3.3c	3.7c	3713bc	3841bc	2946b
WAB 56-50	9.7b	8.7b	6.3b	9.3b	9.3b	6.1b	1137d	1803d	1628c
FARO 40	12.3a	10.1a	9.1a	13.7a	11.2a	9.7a	2819c	3022c	1641c
SE±	-	-	-	-	-	-	3748bc	4007ab	3978ab
Sorghum Crop	-	-	-	-	-	-	1645bc	3965ab	4003ab
Infested	-	-	-	-	-	-	4823a	4937a	4311a
SAMSORG 3	0.15	0.22	0.30	0.21	0.31	0.32	307.7	327.3	318.2
ICSV111	7.1a	6.1a	5.7a	8.7a	7.3a	6.3a	2875c	3022c	3006c
SAMSORG 14	3.6b	3.1b	3.9b	4.3b	4.0b	3.9b	3288b	3477b	3320b
No Infestation	0.0c	1.2c	1.7c	1.8c	1.4c	1.5c	3927a	4003a	3937a
SAMSORG 3	0.03	0.05	0.07	0.07	0.08	0.09	102.1	132.2	101.2
ICSV111	0.13*	0.11*	NS	0.16*	0.18*	NS	NS	NS	NS
SAMSORG 14	40.02	26.33	27.12	23.33	17.96	19.11	14.63	19.23	18.99

Means followed by same letter(s) within a column are no significantly different at 5% probability (DMRT). WAP Weeks after planting

* - Significant at 5% probability (DMRT)

NS - Not significant at 5% probability (DMRT)

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