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Management of *Striga hermonthica* on Sorghum (*Sorghum bicolor*) Using Arbuscular Mycorrhizal Fungi (*Glomus mosae*) and NPK Fertilizer Levels

[1]K.M. Isah, [1]Niranjan Kumar, [2]S.T. O. Lagoke and [2]M.O. Atayese
[1]Department of Crop Production, Faculty of Agriculture, Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria
[2]Department of Plant Physiology and Crop Production, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria

Abstract: Trials were conducted in the screen house of Niger State College of Agriculture, Mokwa (09°18'N; 05°04'E) in the Southern Guinea Savannah agro-ecological zone of Nigeria during October-December, 2008 and January-March, 2009. The objective was to evaluate the effect of management of *Striga hermonthica* on sorghum (*Sorghum bicolor*) using Arbuscular mycorrhizal fungi and NPK fertilizer levels. The trials were laid out in split-split plot arrangement in a randomized complete block design. The main-plot treatments consisted of three sorghum varieties; SAMSORG 3, ICSVIII and SAMSORG 14 while the sub-plot treatments consisted of inoculations; *Striga* mixed with *Glomus*, *Striga* only and *Glomus* only as well as no inoculation control. The sub-sub-plot treatments were made up of NPK fertilizer levels; (100 kg N, 50 kg P_2O_5, 50 kg K_2O ha^{-1}), (50 kg N, 50 kg P_2O_5, 50 kg K_2O ha^{-1}) and (0 kg N, 0 kg P_2O_5, 0 kg K_2O ha^{-1}). The result obtained showed that sorghum variety SAMSORG 3 were taller, having more vigour and lower reaction to *Striga* parasitism which resulted in the crop producing higher dry matter compared to the other two varieties. The plots inoculated with *Striga* only supported shorter plants of sorghum varieties, higher vigour and lower reaction score to *Striga* compared to *Striga* mixed with *Glomus*. It is obvious in this study that the crop performance increases with increase in the rates of NPK fertilizer applied.

Key words: *Striga hermonthica*, arbuscular mycorrhizal fungi (*Glomus mosae*), NPK fertilizer levels

INTRODUCTION

Striga hermonthica [Del.] Benth. is a hemi-parasitic weed and major obstacle to crop production particularly cereals in the dry savannas of sub-Saharan Africa where producers lose half of their produce (Berner *et al*., 1995; Kanampiu *et al*., 2002). This weed causes significant yield losses in West Africa that range from 10 to 100% depending on cultivar and crop (Lagoke *et al*., 1991; Obilana and Ramaiah, 1992; Gressel *et al*., 2004). Sorghum (*Sorghum bicolor* [L.] Moench) is cultivated at large area which is up to 34% of total cereal production in Nigeria (Akintayo and Sedgo, 2001). However, it has been reported that *Striga* infestation in sorghum is higher in Nigeria than in other West African countries (Gressel *et al*., 2004).

The subterranean developmental stage of *Striga* is the most critical and damaging stage to its host which is approximately 75% of the overall *Striga* damage (Parker and Riches, 1993). Therefore, this hemi-parasite causes damage to host before its emergence. At present, there is no single method effective enough to put the problem of *Striga* at abeyance. In view of the physiology of *Striga* seed emergence, there is the need to concentrate on the immediate soil biotic environment for a management practice that will complement the existing control methods. Therefore integrated approach to *Striga* management may be crucial for successful *Striga* management. Recently, it has been reported that the use of certain soil microorganisms can be effective in inhibiting or suppressing the germination of *Striga* seed. (Parker and Riches, 1993; Berner *et al*., 1995; Mathimaran *et al*., 2005). Indeed, some studies (Giovannetti and Mosse, 1980; Mathimaran *et al*., 2005) have shown that certain soil-borne saprophytic bacteria have a potential to control *S. hermonthica* by inhibiting seed germination. However, the survival of inoculated bacteria was usually not sustained in subsequent crops and thus implying the need for repeated application every cropping season (Mathimaran *et al*., 2005). Low levels of applied nitrogen increased *Striga* emergence on soils of low fertility and decreased on fertile ones (Patterson, 1990; Gworgwor and Webber, 1991; Lagoke and Isah, 2010).

Corresponding Author: K.M. Isah, Department of Crop Production, Faculty of Agriculture, Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria

However, there are certain fungi in the soil known as Arbuscular Mycorrhizal Fungi (AMF) which maintain symbiotic association with root of plants. More than 90% of plant species are known to be involved in this association. Benefits derivable include improved water and nutrient uptakes in poor and dry soils (Osonubi *et al*., 1991), enhanced growth (Mathimaran *et al*., 2005) and tolerance to diseases (Vierheilig *et al*., 2000) among others. These fungi are able to confer these advantages in mycorrhizal plants due to their ability to extend the area of nutrient and water exploitation arising from hyphal extension, competing for infection sites with other microorganisms and possibly stimulation of certain antagonistic substances. Vierheilig *et al*. (2000) reported that plants colonized by an AM fungus suppress subsequent colonization by other pathogens through altered root exudates but did not discuss about the fungus being the secondary symbiotic. This study was therefore aimed at managing *S. hermonthica* using Arbuscular Mycorrhizal fungi (*Glomus mosae*) and NPK fertilizer levels on sorghum.

MATERIALS AND METHODS

The experiment was conducted in the screen house of Niger State College of Agriculture, Mokwa green house during October to December, 2008 and January to March, 2009. The design was a split-split plot arrangement in a randomized complete block design. The main plot treatments consisted of three sorghum varieties; SAMSORG 3, ICSVIII and SAMSORG 14 while sub-plot treatments consisted of inoculants; *Striga* mixed with *Glomus*, *Glomus* only, *Striga* only and no inoculation control. The sub-sub plot treatments consisted of compound fertilizer levels; 100 kg P_2O_5-50 kg K_2O/ha, 50 kg N-25 kg P_2O_5-25 kg K_2O/ha and 0 kg N-0 kg P_2O_5-0 kg K_2O/ha. Isah *et al.* (2009) had earlier reported the ability of SAMSORG 3 and ICSV III to be tolerant or resistant varieties to *S. hermonthica* parasitism while SAMSORG 14 was susceptible.

The soil which was collected from the crop farm was sieved to remove stone and debris and filled into the pots. The pots inoculated with *Striga* were filled to two-third depth while the uninoculated pots were filled to the brim. The remaining one third of the pots inoculated with *Striga* was filled with soil-*Striga* seed mixture for the inoculated pots. The soil were inoculated with approximately 3000 *Striga* seeds per pot using the procedure described by Kim (1994) and Berner *et al.* (1997). Fifty grams of the AM fungal inoculums collected from International Institute of Tropical Agriculture which was multiplied in the University of Agriculture, containing spores of *Glomus mosae*, hyphae and root fragments of maize as host was introduced into the planting hole of inoculated pots while attenuated inoculum of the same quantity was introduced into the planting hole of uninoculated plants. Three sorghum seeds (after surface sterilization in 1% NaOCl for 15 min and subsequent rinsing with demineralised water were sown per pot. The plants were watered to field capacity for the first weeks and thereafter with 10 mL of water in 48 h. The seedlings were later thinned down to two per pot at two weeks after planting. Mycorrhizal root colonization was determined by observing the stained root samples using grid-line intersect method of (Phillips and Torrey, 1970; Giovannetti and Mosse, 1980).

The data collected are sorghum height, vigour and reaction scores and *Striga* shoot count all at 6, 9 and 12 Weeks after Planting (WAP), days to first *Striga* emergence, sorghum dry weight and *Striga* shoot dry weight at harvest.

Data collected was subjected to Analysis of Variance (ANOVA) according to Steel and Torrie (1960) and Fishers Least Significant Difference (LSD) was used to compare treatment means using SAS (2009) statistical package.

RESULTS AND DISCUSSION

Sorghum varieties: Sorghum varieties differed significantly in plant height; crop vigour score, crop reaction score and *Striga* shoot count all at 6, 9 and 12 WAP as well as days to emergence of *Striga*, *Striga* and crop shoot dry weights at harvest and in the combined analyses. SAMSORG 14 had shorter plants than SAMSORG 3 in all cases and ICS VIII at 6 and 9 WAP only (Table 1). SAMSORG 3 also had significantly higher vigour score (Table 2) but lower reaction score (Table 3) at 6, 9 and 12 WAP than the other two sorghum varieties evaluated in this trial. *Striga* shoot emergence count at 6, 9 and 12 WAP followed the order SAMSORG 3<SAMSORG 14<ICSV III in the trial (Table 4). Days to *Striga* shoot emergence was significantly more on Samsorg 14 compared with the other two varieties (Table 5). SAMSORG 3 also had significantly higher crop shoot dry weight; however, *Striga* shoot dry weight was lower at 6, 9 and 12 WAP than the other two varieties evaluated. (Table 5). Isah *et al.* (2009) had earlier reported that SAMSORG 3 is resistant to *S. hermonthica* parasitism while SAMSORG 14 is susceptible.

Influence of inoculation on growth of sorghum: Inoculation had significant effect on plant height, vigour and reaction scores and *Striga* shoot emergence count all at 6, 9 and 12 WAP as well as crop and *Striga* shoot dry weight at 12 WAP and days to *Striga* emergence in the

Table 1: Effects of inoculation and fertilizer on plant height of Sorghum varieties at 3, 6, 9 and 12 WAP in 2008, 2009 and combined

	Plant height at 3 WAP			Plant height at 6 WAP			Plant height at 9 WAP			Plant height at 12 WAP		
Source	2008	2009	Combined	2008	2009	Combined	2008	2009	Combined	2008	2009	Combined
Host (Sorghum)												
Samsorg 3	37.56	38.12	37.84	83.23^{a}	83.04	83.13^{a}	109.76	105.63	107.70^{a}	111.54	106.88^{a}	109.21^{a}
Samsorg 14	37.51	38.61	38.06	81.35^{b}	78.23	79.79^{c}	105.38	101.52	103.45^{b}	105.92	102.61^{ab}	104.26^{b}
ICSV III	38.30	38.63	38.46	82.81^{a}	80.24	81.52^{b}	107.44	100.06	103.75^{a}	107.43	100.98^{b}	104.20^{b}
SE±(0.05%)	0.43	0.34	0.25	0.23	1.09	0.36	0.91	1.22	0.75	1.26	1.15	0.79
Inoculation												
Striga+Glomus	38.25^{a}	38.48^{b}	38.38^{b}	81.18^{c}	81.48^{a}	81.33^{c}	105.98^{b}	106.12^{a}	106.05^{b}	108.25^{b}	107.58^{a}	107.92^{b}
Striga	35.57^{b}	36.17^{c}	35.87^{c}	75.57^{d}	75.19^{b}	75.38^{d}	97.02^{c}	94.59^{b}	95.80^{c}	96.12^{c}	95.19^{b}	95.65^{c}
Glomus	37.71^{ab}	38.68^{b}	38.20^{b}	82.94^{b}	82.52^{a}	82.73^{b}	110.09^{b}	105.43^{a}	107.76^{b}	111.08^{b}	106.62^{a}	108.85^{ab}
Control	39.64^{a}	40.48^{a}	40.06^{a}	90.16^{a}	82.83^{a}	86.49^{a}	117.09^{a}	103.48^{a}	110.25^{a}	117.73^{a}	104.57^{a}	111.15^{a}
SE±(0.05%)	0.78	0.47	0.29	0.22	1.27	0.41	1.41	2.12	0.87	1.58	2.14	0.91
Fertilizer												
100 kg N-50 kg P_2O_5-50 kg K_2O_5	38.32^{a}	39.09^{a}	38.71^{a}	84.13^{a}	83.21^{a}	83.67^{a}	109.21^{a}	106.21	107.71^{a}	110.08^{a}	107.27^{a}	108.68^{a}
50-25-25	37.92^{a}	38.25^{b}	38.09^{ab}	83.28^{b}	81.28^{b}	82.28^{b}	109.06^{a}	104.15	106.61^{a}	109.59^{a}	104.98^{b}	107.28^{a}
No fertilizer	37.14^{b}	38.01^{b}	37.58^{b}	79.98^{c}	77.02^{c}	78.50^{c}	104.30^{b}	96.85	100.58^{b}	105.21^{b}	98.23^{c}	101.72^{b}
SE±(0.05%)	0.21	0.26	0.25	0.17	0.30	0.36	0.44	0.78	0.75	0.61	0.79	0.79

Means with the same alphabets within same column are not significantly different from one another at $p<0.05$, WAP: Week after planting

Table 2: Effects of inoculation and fertilizer on crop vigour score of sorghum at 6, 9 and 12 WAP in 2008, 2009 and combined

	Crop vigour score at 6 WAP			Crop vigour score at 9 WAP			Crop vigour score at 12 WAP		
	2008	2009	Combined	2008	2009	Combined	2008	2009	Combined
Host (Sorghum)									
Samsorg 3	4.19^{a}	4.27	4.23^{a}	3.72	3.66	3.69^{a}	3.47	3.22	3.34^{a}
Samsorg 14	3.88^{b}	4.11	4.00^{b}	3.52	3.41	3.47^{b}	3.16	2.97	3.06^{b}
ICSV III	3.88^{b}	4.00	3.94^{b}	3.63	3.38	3.51^{b}	3.27	2.97	3.12^{b}
SE±(0.05%)	0.05	0.14	0.05	0.06	0.14	0.05	0.03	0.15	0.05
Inoculation									
Striga+Glomus	4.03^{b}	4.33^{ab}	4.18^{a}	3.66^{b}	3.74^{a}	3.70^{b}	3.25^{c}	3.29^{a}	3.27^{b}
Striga	3.37^{c}	3.66^{c}	3.51^{b}	2.74^{c}	2.96^{b}	2.85^{c}	2.22^{d}	2.51^{b}	2.37^{c}
Glomus	4.18^{ab}	4.48^{a}	4.33^{a}	4.00^{a}	3.77^{a}	3.88^{a}	3.66^{b}	3.33^{a}	3.50^{a}
Control	4.37^{a}	4.03^{b}	4.20^{a}	4.11^{a}	3.48^{a}	3.79^{ab}	4.07^{a}	3.07^{a}	3.57^{a}
SE±(0.05%)	0.09	0.10	0.06	0.07	0.11	0.05	0.07	0.11	0.06
Fertilizer									
100 kg N-50 kg P_2O_5-50 kg K_2O_5	4.11	4.55^{a}	4.33^{a}	4.08^{a}	3.97^{a}	4.02a	4.02^{a}	3.50^{a}	3.76^{a}
50-25-25	4.00	4.13^{b}	4.06^{b}	3.58^{b}	3.47^{b}	3.52^{b}	3.25^{b}	3.08^{b}	3.16^{b}
No fertilizer	3.86	3.69^{c}	3.77^{c}	3.22^{c}	3.02^{c}	3.12^{c}	2.63^{c}	2.58^{c}	2.61^{c}
SE±(0.05%)	0.07	0.06	0.05	0.05	0.06	0.05	0.05	0.07	0.05

Means with the same alphabets within the same column are not significantly different from one another at $p<0.05$, WAP: Week after planting, Vigour score: Using scale (1-5), 1: Not vigorous, 2: Poorly vigorous, 3: Fairly vigorous, 4: Moderately vigorous, 5: Very vigorous

Table 3: Effects of inoculation and fertilizer on crop reaction score of sorghum varieties at 6, 9 and 12 WAP in 2008, 2009 and combined

	Crop reaction score at 6 WAP			Crop reaction score at 9 WAP			Crop reaction score at 12 WAP		
Source	2008	2009	Combined	2008	2009	Combined	2008	2009	Combined
Host (Sorghum)									
Samsorg 3	1.86^{b}	1.69	1.77^{b}	2.36^{b}	2.38	2.37^{b}	3.02^{b}	3.27	3.15^{b}
Samsorg 14	2.52^{a}	1.91	2.22^{a}	2.91^{a}	2.80	2.86^{a}	3.55^{a}	4.08	3.81^{a}
ICSV III	2.27^{a}	2.05	2.16^{a}	2.72^{ab}	3.08	2.90^{a}	3.38^{a}	4.00	3.69^{a}
SE±(0.05%)	0.09	0.16	0.08	0.10	0.13	0.07	0.07	0.20	0.09
Inoculation									
Striga+Glomus	2.11^{b}	1.70^{b}	1.90^{b}	2.48^{b}	2.37^{b}	2.42^{b}	3.07^{b}	3.37^{b}	3.22^{b}
Striga	3.07^{a}	2.37^{a}	2.72^{a}	4.03^{a}	3.63^{a}	3.83^{a}	5.04^{a}	5.22^{a}	5.14^{a}
Glomus	1.92^{b}	1.63^{b}	1.77^{b}	2.11^{c}	2.33^{b}	2.22^{b}	2.96^{b}	3.07^{b}	3.00^{bc}
Control	1.77^{b}	1.85^{b}	1.81^{b}	2.03^{c}	2.70^{b}	2.37^{b}	2.22^{c}	3.48^{b}	2.85^{c}
SE±(0.05%)	0.13	0.13	0.09	0.10	0.17	0.08	0.15	0.21	0.14
Fertilizer									
100 kg N-50 kg P_2O_5-50 kg K_2O_5	1.97^{b}	1.61^{b}	1.79^{c}	2.02^{c}	2.05^{c}	2.04^{c}	2.30^{c}	2.97^{c}	2.63^{c}
50-25-25	2.19^{ab}	1.91^{ab}	2.05^{b}	2.72^{b}	2.75^{b}	2.73^{b}	3.19^{b}	3.63^{b}	3.41^{b}
No fertilizer	2.50^{a}	2.13^{a}	2.31^{a}	3.25^{a}	3.47^{a}	3.36^{a}	4.47^{a}	4.75^{a}	4.61^{a}
SE±(0.05%)	0.11	0.11	0.08	0.10	0.08	0.07	0.08	0.12	0.09

Means with the same alphabets within the same column are not significantly different from one another at $p<0.05$, WAP: Week after planting, Sorghum reaction score used was scale (1 to 9), where 1 was assigned to normal plant growth and 9 was completely dead plant

Table 4: Effects of inoculation and fertilizer on *Striga* shoot count at 6, 9 and 12 WAP in 2008, 2009 and combined

	Striga shoot count/pot at 6 WAP			*Striga* shoot count/pot at 9 WAP			*Striga* shoot count/pot at 12 WAP		
Source	2008	2009	Combined	2008	2009	Combined	2008	2009	Combined
Host (Sorghum)									
Samsorg 3	0.94^{b}	1.80^{b}	1.37^{c}	1.80^{c}	2.72^{b}	2.26^{c}	2.97^{b}	3.22^{b}	3.09^{c}
Samsorg 14	1.69^{ab}	3.52^{a}	2.61^{b}	3.27^{b}	4.80^{a}	4.04^{b}	5.13^{a}	6.38^{a}	5.76^{b}
ICSV III	2.25^{a}	3.72^{a}	2.98^{a}	3.58^{a}	5.36^{a}	4.47^{a}	5.63^{a}	7.19^{a}	6.41^{a}
SE±(0.05%)	0.23	0.15	0.10	0.06	0.18	0.12	0.26	0.39	0.20
Inoculation									
Striga+Glomus	1.59^{b}	4.25^{b}	2.92^{b}	3.59^{b}	6.22^{b}	4.90^{b}	5.92^{b}	7.81^{b}	6.87^{b}
Striga	4.92^{a}	7.81^{a}	6.37^{a}	7.96^{a}	10.96^{a}	9.46^{a}	12.40^{a}	14.59^{a}	13.50^{a}
Glomus	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}
Control	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}	0.00^{c}
SE±(0.05%)	0.19	0.21	0.11	0.18	0.38	0.14	0.25	0.68	0.23
Fertilizer									
100 kg N-50 kg P_2O_5-50 kg K_2O_5	0.91^{c}	2.30^{c}	1.61^{c}	1.97^{c}	3.25^{c}	2.61^{c}	3.00^{c}	4.02^{c}	3.51^{c}
50-25-25	1.36^{b}	2.94^{b}	2.15^{b}	2.44^{b}	4.27^{b}	3.36^{b}	3.94^{b}	5.52^{b}	4.73^{b}
No fertilizer	2.61^{a}	3.80^{a}	3.21^{a}	4.25^{a}	5.36^{a}	4.80^{a}	6.80^{a}	7.25^{a}	7.02^{a}
SE±(0.05%)	0.12	0.11	0.10	0.10	0.12	0.12	0.20	0.19	0.20

Means with the same alphabets within the same column are not significantly different from one another at $p<0.05$, WAP: Week after planting

Table 5: Effects of inoculation and fertilizer on days to *Striga* emergence and crop and *Striga* dry shoot weight of sorghum varieties in 2008, 2009 and combined

	Days to *Striga* emergence			Crop dry shoot weight			*Striga* dry shoot weight
Source	2008	2009	Combined	2008	2009	Combined	2009
Host (Sorghum)							
Samsorg 3	21.02^{a}	20.30	20.66^{a}	95.00	97.32	96.16^{a}	3.19^{b}
Samsorg 14	20.47^{b}	20.19	20.33^{b}	92.36	93.65	93.01^{b}	6.36^{a}
ICSV III	20.22^{b}	20.16	20.19^{b}	93.65	95.07	94.36^{b}	7.03^{a}
SE±(0.05%)	0.08	0.07	0.07	1.22	1.52	0.56	0.42
Inoculation							
Striga+Glomus	41.77^{a}	40.66^{a}	41.22^{a}	95.88^{b}	97.32^{a}	96.60^{b}	7.57^{b}
Striga	40.51^{b}	40.22^{b}	40.37^{b}	81.42^{c}	86.21^{b}	83.82^{c}	14.53^{a}
Glomus	0.00^{c}	0.00^{c}	0.00^{c}	97.74^{ab}	100.15^{a}	98.94^{a}	0.00^{c}
Control	0.00^{c}	0.00^{c}	0.00^{c}	99.63^{a}	97.71^{a}	98.67^{a}	0.00^{c}
SE±(0.05%)	0.12	0.08	0.08	1.16	1.33	0.65	0.67
Fertilizer							
100 kg N-50 kg P_2O_5-50 kg K_2O_5	20.80^{a}	20.22	20.51^{a}	97.68^{a}	98.80^{a}	98.24^{a}	3.85^{c}
50-25-25	20.63^{ab}	20.25	20.44^{a}	95.26^{b}	96.85^{b}	96.05^{b}	5.41^{b}
No fertilizer	20.27^{b}	20.19	20.23^{b}	88.07^{c}	90.40^{c}	89.23^{c}	7.31^{a}
SE±(0.05%)	0.14	0.06	0.07	0.63	0.42	0.56	0.21

Means with the same alphabets within the same column are not significantly different from one another at $p<0.05$

combined analyses. Plants of pots inoculated with *Striga* alone were shorter than those of the pots inoculated with its mixture with *Glomus*, *Glomus* alone and the control (Table 1) as this is in agreement with the study of Mobasser *et al.* (2012) that reported a significant influence of mycorrhizal on plant height of maize. Also Samra *et al.* (1997) reported that the general application of mycorrhiza increased plant heights compared to the control treatments without mycorrhizal infection. The results of this trial are similar to those of other reports showing that infections of mycorrhizal fungi increased plant height compared to controls (Ahiabor and Hirata, 1994; HashemiDezfuli *et al.*, 1999; Olatunji *et al.*, 2008).The various forms of inoculation resulted in shorter plants than those of the control except with *Glomus* at 12 WAP which was not significant (Table 1). Plants inoculated with *Striga* alone had lower vigour scores than those of the other treatments while those of *Striga* plus *Glomus* also had lower scores compared with those of *Glomus* alone and control at 9 and 12 WAP (Table 2). The reaction scores of plants of pots with *Striga* inoculation was obviously higher than those of the other treatments which were similar at 9 and 12 WAP while *Glomus* alone caused higher reaction score than the control at 12 WAP (Table 3). *Striga* shoot emergence count and weight were significantly lower with *Striga/Glomus* mixture inoculation than *Striga* alone while emergence was delayed by the mixture. *Striga* inoculation alone resulted in significantly lower crop shoot dry matter production compared with the other treatments, although *Striga/Glomus* mixture also caused lower values than *Glomus* alone and the control (Table 5).The ability of AMF to reduce *Striga* count can be explained in three ways: (1) The formation of metabolites, especially strigolactones that are responsible for the induction of *Striga* germination is down regulated upon mycorrhizal colonization; (2) Plant metabolites, such as cyclohexenones which arise through carotenoid degradation, that are up-regulated upon mycorrhizal colonization inhibit *Striga* germination and (3) Mycorrhizal colonization induces mycorrhizosphere effects that negatively impact on *Striga* germination (Lendzemo *et al*., 2007).

Influence of fertilizer rates on growth of sorghum: Fertilizer application had significant effect on height, vigour score, reaction score of sorghum as well as shoot count, days to emergence, dry matter production and dry weight of *Striga*. Sorghum plant height at 6 WAP (Table 1) and vigour score at 6, 9 and 12 WAP (Table 2) crop shoot dry weight at 12 WAP (Table 5) increased with the rates of fertilizer applied, while both rates of fertilizer similarly increased plant height of sorghum at 9 and 12 WAP. Conversely, crop reaction score (Table 3) and emergence shoot count (Table 4) and dry weight of *Striga* (Table 5) decreased with the rates of applied fertilizer. The two rates of fertilizer applied significantly delayed *Striga* emergence on sorghum compared to no fertilizer control. Gworgwor and Webber, 1991) observed that application of high nitrogen increases the performance of cereal crops under *Striga* infestation. This is due to the fact that nitrogen fertilizer reduced the severity of *Striga* attack while simultaneously increasing the host performance (Lagoke and Isah, 2010).

CONCLUSION

Sorghum variety SAMSORG 3 was resistant to *Striga hermonthica* in this study. There was an improvement in the performance of sorghum varieties when *Striga* was mixed with *Glomus* indicating that Arbuscular Mycorrhizal fungi is effective in *S. hermonthica* management. It was further enhanced when higher levels of fertilizer are used especially with those sorghum varieties found to be susceptible to *S. hermonthica* parasitism.

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