

Effect of Intercropping Finger Millet [*Eleusine Coracana* (L.) Gaertn.] With *Desmodium Intortum* on *Striga Hermonthica* Emergence across Planting Seasons

Noel N. Makete¹_a, Linnet S. Gohole²_b, Wilson R. Opile²_c and Chrispus A. O. Oduori³_d

Kenya Agricultural and Livestock Research Organization,
P.O. Box 169 -50100, Kakamega¹.
Email _aneks2030@yahoo.com

University of Eldoret P.O. Box 1125, Eldoret²
Email: _blsgohole@gmail.com; _cdropile@yahoo.com

Kenya Agricultural and Livestock Research Organization³,
P.O. Box 523 Kisii.
Email: _dchrisoduori@yahoo.com

Abstract

Striga hermonthica is a major constraint affecting finger millet production in western Kenya. Yield potentials of improved finger millet varieties remain unexploited due to susceptibility to *Striga*. Previous studies have shown the value of intercropping maize with *Desmodium* spp. in efforts to control *Striga*. Recent studies have shown related responses when a local finger millet variety was intercropped with *Desmodium* spp. This study investigated the effect of intercropping Green leaf *Desmodium* (*Desmodium intortum*) with finger millet on *Striga* emergence and finger millet yield across two planting seasons. Trials were set up on-station at Kenya Agricultural and Livestock Research Organization's Alupe centre (KALRO-Alupe) and on-farm at Okiludu in Teso South during the 2013 short rains and 2014 long rains seasons. Results in this study indicated no consistent evidence to show that intercropping finger millet varieties with *Desmodium intortum* suppressed *Striga* at the two sites during the two seasons tested. However, lower *Striga* counts were observed during the long rains season (35.9 *Striga* plants/plot) while higher *Striga* counts (151.4 *Striga* plants/plot) were observed during the short rains season. Finger millet yield differed significantly across planting seasons where higher yield (1.1t/ha) was observed during the long rains season and lower yield (0.6t/ha) during the short rains season. This gave a clear indication that strigolactones production may have differed across rainfall seasons. Farmers in *Striga* infested Alupe and Teso sub-counties are advised to consider planting finger millet during the long rains season when *Striga* emergence is low for better yields.

Key Words: Finger millet, Rainfall seasons, *Striga hermonthica*, Strigolactones

Introduction

Striga (Witchweed) is the most economically important parasitic seed plant weed in the world (Atera *et al.*, 2013). Average yield loss due to *Striga* in Kenya is 1.15, 1.10 and 0.99 tons per hectare for maize, sorghum and millet, respectively (MacOpiyo *et al.*, 2010). Many people in western Kenya depend on finger millet as a subsistence and food security crop that is important for its nutritive and cultural value. It also has a higher and stable market price when compared to other cereals like maize (Mgonja *et al.*, 2007). Western Kenya has two distinct crop planting seasons i.e. the long rainy season (March – August) and the short rainy season (September – December) (Mugalavai *et al.*, 2008) within which farmers plant their crops including finger millet. *Striga hermonthica* is one of the biggest constraints affecting finger millet production (Atera, 2010). When some susceptible improved finger millet varieties are planted in areas with *Striga*, more than 50% yield loss is observed (Oduori, 2008). Farmers in western Kenya have responded to the problem of *Striga hermonthica* through various traditional control methods such as use of manure, hand weeding, uprooting and burning of *Striga* plants in affected fields. Research findings show that these methods are insufficient to manage *Striga* once it is well established on a field (Woomer *et al.*, 2004). Modern options to control *Striga* sp. such as crop resistance, intercropping cereals with fodder legumes such as *Desmodium uncinatum* have been developed. One of the most promising *Striga* management strategies in susceptible cereal crops has been intercropping with *Desmodium* sp. (Khan *et al.*, 2008).

Between 2007 and 2008, International Center for Insect Physiology and Ecology (ICIPE) scientists evaluated the potential of *Desmodium intortum*, a drought-tolerant desmodium species, for ‘push–pull’ application in a local finger millet variety in western Kenya. Results of the study showed that *Desmodium* species offered an effective control of both *Striga* and stem borers for finger millet (Midega *et al.*, 2010). However, the yield obtained in the local landrace plots was low compared to the potential of improved finger millet varieties which ranges from 2,250–2,925kg/ha (Oduori, 2008). The purpose of this study was to explore the potential of intercropping improved finger millet varieties with *Desmodium intortum* for management of *Striga* across finger millet planting seasons.

Methods

Trials were set up on-station at Kenya Agricultural and Livestock Research Organization’s Alupe centre (KALRO-Alupe) and on-farm at Okiludu in Teso South. The experiment was laid out in a Randomized complete block design in a split-plot arrangement during the 2013 short rains (September – December) and 2014 long rains (March – August) seasons. Treatments consisted of four improved finger millet varieties namely Gulu –E, U-15, P-224 and Okhale -1 intercropped with Green Leaf *Desmodium* (*Desmodium intortum*) and compared with finger millet mono crop plots. Varieties were

assigned to main plots while the cropping system to sub-plots. The most susceptible variety to Striga; P-224 was the control. Data was collected over two cropping seasons; Short Rains and Long Rains. Total Striga counts were carried out ten weeks after planting and at physiological maturity. Basal tiller counts and plant height were conducted at physiological maturity. Finger millet dry grain yield per plot was recorded after harvesting and threshing. Data collected was analyzed using PROC ANOVA procedure of SAS software 9.1 and treatment means separated by Fischer's protected LSD. Natural Log transformation of Striga counts; $LStriga = \text{Log}(Striga + 1)$ was carried out before analysis due to the large variation in Striga counts.

Procedures

Treatments were replicated three times at each site with a total of 24 plots per site. Plots measured 6 m x 6 m each. Green leaf Desmodium was planted after every row of Finger Millet and around the experimental plots in three rows as guard rows. Green leaf Desmodium was sown by drilling three weeks before planting the finger millet. Finger Millet was spaced at 60 x 15 cm. Finger millet plots were applied with 20 kg P_2O_5 per ha at planting and 20 kg N per ha as a top dress. Weeding was carried out twice during the growing season; three weeks after emergence and three weeks later to reduce crop weed competition during finger millet's critical growing period. This was replicated on-farm where one farmer hosted the trial and the other group members participated in implementation, maintenance and monitoring of the experiment. Parameters measured included total Striga counts per plot, number of basal tillers, plant height at physiological maturity (grain milk stage) and dry grain yield per plot of finger millet. Individual Striga plants were uprooted and counted and the total Striga counts recorded ten weeks after planting when the first Striga weeds started appearing and at physiological maturity when most of them had established. Basal tiller counts and plant height were conducted at physiological maturity. A 1 m x 1 m quadrant was tossed three times in each plot and a stone tossed within the quadrant to obtain the representative plant. A meter rule was used to measure the height from ground level up to the tip of the plant. Number of tillers was also recorded on the same plants. Where the representative plant had tillers, the main plant was measured for height and not the tillers. Averages of the plant heights and number of tillers of the three plants were then recorded.

Results

Striga Emergence in Finger Millet – Desmodium Intercrops and Finger Millet Mono-Crops

Results from the 2013 short rains season at Alupe and Teso indicated no difference in the suppression of Striga by *Desmodium intortum* in finger millet intercrop and mono-crop plots. There were no significant differences ($P \geq 0.05$) in the number of

emerging Striga plants between intercrop and mono-crop plots as indicated by the transformed Striga means in parenthesis shown in Table 1. There were also no significant differences ($P \geq 0.05$) in the number of emerging Striga plants between varieties at both Alupe and Teso as indicated in Table 1.

Suppression of Striga by *Desmodium intortum* in intercrop plots during the 2014 long rains season did not differ from that observed in mono-crop plots. There were no significant differences ($P \geq 0.05$) in the number of emerging Striga plants observed between finger millet intercrop and mono-crops during the long rains season at both Alupe and Teso sites as indicated by the transformed Striga count means in parenthesis shown in Table 2. There was however a significant difference in the number of emerging Striga plants between varieties at Teso site where varieties P-224, Gulu-E, and U-15 had significantly lower ($P \leq 0.05$) Striga counts than Okhale-1.

Table 1: Mean number of Striga plants in finger millet intercrop and mono-crop plots at Alupe and Teso sites during the 2013 short rains season

Cropping System	Alupe					Teso				
	Varieties					Varieties				
	Gulu-E	Okhale-1	P-224	U-15	Mean	Gulu-E	Okhale-1	P-224	U-15	Mean
Intercropping	37.3Aa (3.62)	74.4Aa (4.31)	194.4Aa (5.27)	68.7Aa (4.23)	77.7a (4.35)	126.5Aa (4.84)	561.2Aa (6.33)	221.4Aa (5.40)	206.4Aa (5.33)	239.8a (5.48)
Mono-cropping	232.2Aa (5.45)	223.6Aa (5.41)	137.0Aa (4.93)	46.5Aa (3.84)	135.6a (4.91)	79.8Aa (4.38)	450.3Aa (6.11)	214.9Aa (5.37)	235.1Aa (5.46)	206.4a (5.33)
LSD				(2.23)					(1.97)	
C.V. (%)				27.5					20.8	

Means with the same capital letter in a row or same small letter in a column denote no statistical significant difference at $P \geq 0.05$

Note: Conclusions of differences in the actual Striga count means(not in parenthesis) were drawn from comparing the transformed means indicated in parenthesis using the LSD figure for the transformed means indicated in parenthesis too.

Table 2: Mean number of Striga plants in finger millet intercrop and mono-crop plots at Alupe and Teso sites during the 2014 Long rains season

Cropping System	Alupe					Teso				
	Varieties					Varieties				
	Gulu-E	Okhale-1	P-224	U-15	Mean	Gulu-E	Okhale-1	P-224	U-15	Mean
Intercropping	40.9Aa (3.71)	63.4Aa (4.15)	64.1Aa (4.16)	22.9Aa (3.13)	44.3a (3.79)	15.0Bb (2.71)	144.0Aa (4.97)	15.6Bb (2.75)	11.2Bb (2.42)	24.8a (3.21)
Mono-cropping	34.8Aa (3.55)	30.0Aa (3.40)	35.9Aa (3.58)	19.1Aa (2.95)	29.1a (3.37)	17.6Bb (2.87)	20.1ABab (3.00)	15.8Bb (2.76)	19.5AB ab (2.97)	18.2a (2.90)
LSD				(1.67)					(2.2)	
C.V. (%)				39.8					41.2	

Means with the same capital letter in a row or same small letter in a column denote no statistical significant difference at $P \geq 0.05$

Note: Conclusions of differences in the actual Striga count means(not in parenthesis) were drawn from comparing the transformed means indicated in parenthesis using the LSD figure for the transformed means indicated in parenthesis too.

Striga Emergence, Yield and Related Yield Components in Finger Millet across Planting Seasons

Results of Alupe and Teso sites indicated a difference in the number of emerging Striga plants across the two seasons tested. More Striga plants emerged during the short rains season when compared to the long rains season. Striga numbers were significantly lower ($P \leq 0.05$) during the long rains season than during the short rains season where a significantly higher number of Striga plants emerged. Tillering in finger millet was also different across the two seasons. The number of tillers in finger millet was significantly higher during the long rains season than those in the short rains season ($P \leq 0.05$) as indicated in Table 3. Plant height and finger millet yield differed across seasons. Finger millet plants were significantly taller ($P \leq 0.05$) during the long rains season than those in the short rains season as indicated in Table 3. Finger millet yield was also significantly higher ($P \leq 0.05$) during the long rains season than in the short rains season as shown in Table 3.

Table 3: Mean Striga densities, finger millet yield and related yield components across planting seasons

			Striga(no.)	Tillers(no.)	Plant height (cm)	Finger millet Yield(T/H a)
Season	2013	Short	151.4a	1.88b	68.79b	0.55b
	Rains					
	2014	Long	35.9b	5.19a	75.65a	1.06a
	Rains					
Mean			93.65	3.53	72.22	0.81
LSD (0.05)			1.6	0.31	2.72	0.09
P-Value			<0.001	<0.001	<0.001	<0.001
C.V (%)			25.4	21.4	9.2	27

Means with different letters in the column denote a statistically significant difference ($P \leq 0.05$)

Relationship between Finger Millet Yield and Striga Density across Sites and Seasons

A relationship plot generated for finger millet yield and Striga density results from the 2013 short and 2014 long rains seasons indicated a negative relationship between finger millet

yield and Striga density. An increase in Striga density corresponded to a decrease in finger millet yield as indicated by the finger millet yield versus log Striga (transformed counts) relationship diagram (Figure 1). Teso site had the highest amount of Striga (Green color) during the short rains season which corresponded to the lowest finger millet yield. There was lower Striga density at Teso (Blue color) during the long rains season which corresponded to higher finger millet yield. Similarly, Alupe had more Striga (Black color) and lower finger millet yield during the short rains season while less Striga (Red color) and higher finger millet yield during the long rains season.

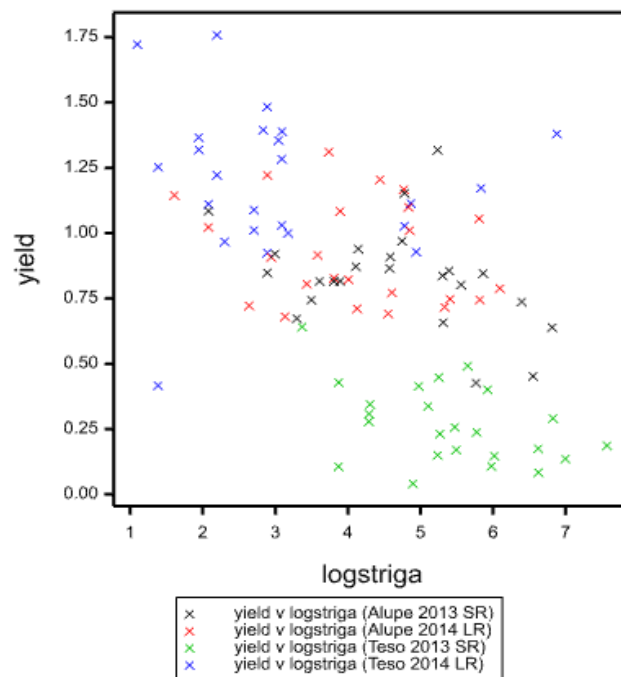


Figure 1: Relationship between finger millet yield and Striga density during the long and short rains seasons at Alupe and Teso.

Discussion

Factors Influencing Striga Density and Finger Millet Yield

a) Soil Moisture

Results in this study indicated low number of emerging Striga plants during the long rainy season and higher number of emerging Striga plants during the short rainy season. Striga seed germinates only in the presence of germination stimulants

(strigolactones). This then implies that the amount of strigolactones available for *Striga* germination may have been higher during the short rains season than in the long rains season hence prompting more *Striga* seeds to germinate during the short rains season as opposed to the long rains season. One possible reason for this could be that the long rains season may have brought about excess moisture in the soil that may have caused leaching of some strigolactones leaving behind low amounts for *Striga* germination. Gualbert *et al.*, (2004) carried out a study on sowing dates as a component of integrated *Striga* control for maize and sorghum. They observed that excess soil moisture can cause leaching of host root exudates (strigolactones) that normally trigger *Striga* germination which in turn reduces germination of *Striga hermonthica*. This may imply that the amounts of strigolactones available in the soil to trigger *Striga* germination during the long rains season may have been lower than those available during the short rains season hence low number of emerging *Striga* plants during the long rains season as opposed to the short rains season. This may then imply that only those *Striga* seeds that may have been exposed to the available strigolactones were able to germinate. A study carried out by Yoneyama *et al.*, (2010) on Strigolactones as germination stimulants for root parasitic plants (*Striga spp.*, *Orobancha spp.* and *Phelipanche spp.*) revealed that, seeds of these root parasites would not germinate unless exposed to germination stimulants. This ensured that only seeds in the host plant's rhizosphere would germinate thus maintaining their seed bank in the soil.

Another explanation for the possible difference in strigolactones production across rainfall seasons would be related to the importance of strigolactones to plants. A question and answer article written by Smith, (2014) reveals that Strigolactones are important to the plants that produce them because they help these plants scavenge for nutrients during periods of environmental stress. In addition, he indicated that most higher plants respond to environmental deficiencies by producing a higher amount of strigolactones which in turn stimulate hyphal branching in a fungal symbiont that forms Arbuscular Mycorrhizae (AM) on their host plants. The fungal hyphae spread widely in the soil and helps to acquire mineral nutrients which the plant takes up. This implies that the periods of low soil moisture during the short rains season in this study; that may have resulted from the short rainfall duration (appendix i), may have led to lower nutrient availability to the finger millet plants. Finger millet plants in turn may have produced a higher amount of strigolactones to help them scavenge for the nutrients. More *Striga* seeds existing in the soil in turn responded to the available opportunity (germination stimuli) and germinated as well. On the other hand, because there was adequate water supply resulting from the longer rainfall duration during the long rains season (appendix i), finger millet plants were able to easily take up nutrients from the soil thus directed more energy to shoot development rather than producing additional strigolactones that would have stimulated hyphal branching in AM to help finger millet plants scavenge for more nutrients from the soil. The lower amount of strigolactones produced may have only

triggered germination in *Striga* seeds that were close to them, resulting in lower *Striga* density during the long rains season when compared to the short rains season. Ruiz-Lozano *et al.*, (2016) studied the correlation between AM root colonization, strigolactones levels and drought severity in lettuce and tomatoes. They suggested that under unfavourable conditions, plants might increase strigolactones production in order to promote symbiosis establishment to cope with the stress. Unfortunately, since the finger millet plants in this study were in *Striga* infested areas, these high amounts of strigolactones produced may have also triggered high *Striga* germination leading to a emergence of more *Striga* plants during the short rains season when compared to the long rains season.

It was also observed in this study that finger millet yield was higher during the long rains season than in the short rains season. This variation in yield across seasons could possibly be due to differences in adequate soil moisture availability during finger millet's critical growing period. Soil moisture stress adversely affects growth and yield of crops especially cereals if it occurs during the critical growth stages (early vegetative, floral initiation, anthesis, fertilization and grain formation) (Kolay, 2008). The long rains season may have resulted to provision of adequate soil moisture during the critical growth stages of finger millet resulting in better yields than in the short rains season where finger millet plants may have experienced longer periods of moisture stress. Since there were lower number of *Striga* plants during the long rains season compared to the short rains season, the lower numbers of *striga* plants may have exerted less *Striga* pressure on the finger millet plants during the long rains season which in turn produced higher yield compared to the high *Striga* pressure exerted on the finger millet plants during the short rains season hence lower yields. This implies that the higher number of *Striga* plants observed during the short rains season deprived many finger millet plants of available soil water and nutrients more than in the long rains season, leading to more stunting thus depressing yields more and vice-versa. Generally, a decrease in finger millet yield was observed as *Striga* numbers increased during this study. An increase in the number of *Striga* plants from 1 to 100 led to an average decrease in finger millet yield of 0.14 T/Ha. This increase in *Striga* density negatively affected finger millet yield. Berhane (2016) reviewed the management of *Striga* and reported that the effect of *Striga* damage on crops is a reduction in yield. He related the extent of yield loss to the incidence and severity of attack besides the host's susceptibility to *Striga* and environmental factors. Babiker (2007) also studied *Striga* in Africa and reported that severe *Striga* infestation can lead to complete crop failure. A policy brief written by Van Mourik *et al.*, (2015) on *Striga hermonthica* seed bank density in infested fields also indicated a linear relationship for sorghum yield loss and *Striga* seed density.

More tillers were produced during the long rains season compared to the short rains season during this study. This also implies that adequate water supply during the critical growing period is also an important factor in tillering of finger millet. Assuero

and Tognetti, (2010) observed that low water availability affects tillering by reducing the number of potential sites for tillering in finger millet. More number of tillers which form heads eventually contribute to increase in yield hence the increase in finger millet yield recorded during the long rains season when compared to that recorded during the short rains season. Govindaraj *et al.*, (2009) also found out that number of productive tillers positively associated with grain yield in pearl millet. This implies that there may have been more productive tillers produced during the long rains season as opposed to the short rains season thus contributing to an increase in finger millet yield during the long rains season.

b) Cropping System

Results in this study indicated that *Desmodium intortum* did not have a suppressing effect on Striga at both sites over the two seasons tested. This was contrary to the expectation from previous studies by Khan *et al.*; (2006) which indicated that *Desmodium* suppresses Striga when intercropped with cereals. The lack of variation observed in the number of emerging Striga plants between intercrop and mono-crop plots in this study may be attributed to a possible high load of Striga seed in the soil and the short period of time the trial lasted. *Desmodium intortum* may have required more than the two seasons within which the trial was conducted to have a significant reducing effect on emerging Striga plants. Previous studies carried out by Khan *et al.*; (2006) on the potential role of *Desmodium spp.* in the combined control of Striga and stem borers over three years confirmed that *Desmodium spp.* suppressed Striga and increased maize yield in all the six seasons tested and Striga suppression increased with each additional season. This may imply that if *Desmodium* is used as an intercrop in cereals over a longer period of time there could be more significant suppression of Striga than when planted for shorter periods. Results in this study did not also concur with Midega *et al.*, (2010) who found out that *Desmodium spp.* offered an effective control for Striga in a local finger millet during the short rains season of 2010 when the trial was conducted.

Conclusion

Results from this study indicated no consistent evidence to show that intercropping finger millet with *Desmodium intortum* reduced Striga. Evidence in this study indicated lower number of emerging Striga plants in finger millet during the long rains season and higher number of emerging Striga plants during the short rains season. Finger millet yield was higher during the long rains season than in the short rains season. An increase in Striga density led to a decrease in finger millet yield.

Acknowledgements

The Mc knight Foundation funded this research. We thank G. Aringo for technical assistance, S. Oundo for hosting the on-farm trials and ICIPE – Mbita for literature.

References

- Assuero, S.G. and Tognetti, J.A. (2010). Tillering Regulation by Endogenous and Environmental Factors and its Agricultural Management. *The American Journal of Plant Science and Biotechnology*, 4(Special Issue 1), 35-48.
- Atera, A. E., Takashige, I., Onyango, J.C., Kazuyuki, I. and Tetsushi, A. (2013). Striga Infestation in Kenya: Status, Distribution and Management Options. *Sustainable Agricultural Research*, 2, 99-108.
- Atera, E. A. (2010). Effect of *Striga* infection on NERICA rice cultivars and farmers' perception on its control mechanisms in sub-Saharan Africa. *M.Sc. Thesis, Kobe University, Japan*.
- Babiker, A.G.T. (2007). Striga: The spreading Scourge in Africa. *Regulation of Plant Growth and Development*. 42,74-87.
- Berhane, S. (2016). Review on Striga weed management. *International Journal of life Sciences*. 2,110-120.
- Combined control of *Striga hermonthica* and stemborers by *Desmodium spp.* Intercrops. *Crop protection Journal* 25,989-995.
- Govindaraj, M., Selvi, B., Rajarathinam, S. (2009). Correlation Studies for Grain Yield Components and Nutritional Quality Traits in Pearl Millet (*Pennisetum glaucum* (L.) R. Br.) Germplasm. *World Journal of Agricultural Sciences*, 5(6), 686-689.
- Gualbert, G., Etiennne, A., Jonas, C. (2004). Sowing date or transplanting as components for integrated *Striga hermonthica* control in grain-cereal crops? *Crop Protection*, 23, 379-386.
- Khan, Z.R., Pickett, J.A., Hassanali, A., Hooper, A.M. and Midega C.A.O. (2008). Desmodium species and associated biochemical traits for controlling Striga species: present and future prospects. *Weed research*, 48, 1-5.11.
- Khan, Z.R., Pickett, J.A., Wadhams, L.J., Hassanali, A. and Midega, C.A.O. (2006).
- Kolay, A.K. (2008). Water and Crop Growth. Page 44. *Atlantic Publishers and Distributors, New Delhi*.
- Mac Opiyo, L., Vitale, J., and Sanders, J. (2010). An ex-ante assessment of a Striga control programme in EastAfrica. *Kilimo Trust*, 6-25.
- Mgonja, M.A., Lenné, J.M., Manyasa, E. and Sreenivasaprasad, S. (2007). Finger Millet Blast Management in East Africa. Creating opportunities for improving production and utilization of finger millet. *Proceedings of the First International Finger Millet Stakeholder Workshop*.
- Midega, C.A.O., Khan, Z.R., Amudavi, D.M., Pitchar, J. and Pickett, J.A. (2010). Intergrated management of *Striga hermonthica* and cereal stem borers in finger millet (*Eleusine coracana* (L.) Garten.) through intercropping with *Desmodium intortum*. *International journal of pest management*, 56, 145-151.

- Mugalavai, E.M., Kipkorir, E.C., Raes, D. and Rao, S. M. (2008). Analysis of rainfall onset, ceasation and length of growing season for western Kenya. *Agriculture and Forest Meteorology*, 148, 1123-1135.
- Oduori, C. O., (2008). Breeding Investigations of Finger Millet Characteristics including Blast Disease and *Striga* Resistance in Western Kenya. *PhD Thesis, Research Space, University of KwaZulu-Natal*.
- Ruiz-Lozano, J.M., Zamarreno, A.M., Molina, S., Andreo-Jimenez, B., Porcel, R., Garcia-Mina, J.M., Ruyter-Spira, C. and Lopez-Raez, J.A. (2016). *Plant, Cell and Environment* 39(2), 441-452.
- Smith, S. (2014). Q & A: What are strigolactones and why are they important to plants and soil microbes. *BMC Biology* 12,19.
- Yoneyama, K., Ayman, A., Xie, X., Kaori, Y. and Yasutomo, T. (2010). Strigolactones as germination stimulants for root parasitic plants. *Oxford Journals*, 51, 1095-1103.

Appendix 1: Mean Monthly Rainfall (mm) for Busia County during 2013 short rains and 2014 long rains seasons.

Year	Season	Month	Rainfall (mm)
2013	Short rains	September	244.1
2013	Short rains	October	172.7
2013	Short rains	November	176.2
2013	Short rains	December	78.4
2014	Long rains	March	119.1
2014	Long rains	April	118.0
2014	Long rains	May	205.4
2014	Long rains	June	57.7
2014	Long rains	July	109.4
2014	Long rains	August	115.3

Source: Alupe Meteorological Station.