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Farmer perception on effects of the witch weed infestations in sorghum in Ishongorero sub county, Ibanda district, south western Uganda

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Abstract

Sorghum (*Sorghum bicolor* (L.) Moench is the fifth most important cereal in the semi arid regions of the world in terms of production and area planted. However, sorghum production is constrained by a number of factors including pests and diseases. Witch weed (*Striga* spp.) is one of the pests constraining sorghum production in most parts of Uganda including Isonghorero sub-county in Ibanda district. Therefore, the objective of the study was to assess farmer perceptions on effects of the witch weed infestations on sorghum in Ishongorero sub-county. The study was a cross sectional survey. Multi-stage random sampling technique was used to identify and interview 70 respondents comprising of farmers, opinion leaders, political and technical leadership of the sub-county. *Striga* infestation was widespread and devastating in most of the fields surveyed. The effects of *Striga* included stunted growth and reduced yield among others. Different control measures were reportedly employed to contain the spread of *Striga* including uprooting and crop rotation/fallowing. *Striga* weed was mostly devastating at the pre-flowering stage and exhibited a number of effects including stunted growth and reduced yields among others. Different control measures were employed to contain the spread of *Striga* including uprooting and crop rotation/fallowing.

Key words: Control, effects, prevalence, yield

Résumé

Le sorgho (*Sorghum bicolor* (L.) Moench est la cinquième céréale la plus importante dans les régions semi-arides du monde en termes de production et de la superficie ensemencée. Cependant, la production de sorgho est limitée par un certain nombre de facteurs, y compris les parasites et les maladies. La mauvaise herbe sauvage (*Strigaspp.)* est l'un des ravageurs qui limitent la production de sorgho dans la plupart des régions de l'Ouganda, y compris le sous comté d'Isonghorero, dans le district d'Ibanda. Par conséquent, l'objectif de l'étude était d'évaluer les perceptions des agriculteurs sur les effets des infestations de mauvaises herbes sauvages sur le sorgho dans le sous comté d'Ishongorero. L'étude était une enquête transversale. Les techniques d'échantillonnage multi-étape aléatoire ont été utilisées pour identifier et entretenir 70 répondants comprenant des agriculteurs, les leaders d'opinion, le leadership politique et technique du sous comté. L'infestation de *Striga* a été généralisée et dévastatrice dans la plupart des domaines étudiés. Les effets de la S*triga* ont inclus, entre autre, un retard de croissance et un rendement réduit. Les mesures différentes de contrôle auraient été utilisées pour contenir la propagation de *Striga* y compris le déracinement et la

rotation des cultures / jachère. Les herbes de *Striga* étaient surtout dévastatrices au stade de préfloraison et présentaient un certain nombre d'effets, y compris un retard de croissance et des rendements réduits, entre autres. Des différentes mesures de contrôle ont été utilisées pour contenir la propagation de *Striga* y compris le déracinement et la rotation des cultures en/ jachère.

Mots clés: contrôle, les effets, la prévalence, le rendement

Background

Sorghum (*Sorghum bicolor* (L) Moench is the fifth most important cereal in the semi arid regions of the world in terms of production and area planted (Mushonga *et al.,* 1992). Besides, the bicolor races, the other races of sorghum widely adapted and grown include *guinea, caudatum, durra* and *fakir.* According to Harlan and de Wet (1972), sorghum is able to produce good yields under dry conditions unfavorable to most other cereal crops. In fact, the crop has been grown for almost 5000 years or more. Accordingly, about 90% of the global area planted to sorghum is in developing countries especially Africa and Asia (FAO, 2002).

In Uganda, sorghum is the third most important cereal crop after maize and finger millet. Sorghum is widely grown in the drier short grass areas of northern, eastern and western parts of the country by the resource poor farmers (Oryokot *et al.,* 1999).Consequently, there are many cultivars of sorghum grown in Uganda for a variety of purposes including food, porridge, beer and fodder as well as cash income. However, production statistics showed that sorghum production in Uganda has decreased from 467000 metric tones to 43,000 tones in 1975 and 2002, respectively (FAO, 2002). According to Ebiyau *et al*. (2005), about 265,000 hectares of sorghum was grown in the south western highlands districts of Kabale, Ibanda and Kamwenge as well as in the lowland areas of east and northern regions of Uganda. The low acreage and production of sorghum is attributed to a number of factors including pest and disease infestations as well as declining soil fertility amongst others. *Striga* weed also commonly known as witch weed is among one of the most devastating pests of sorghum worldover. In fact, *Striga* weed greatly reduced the quantity and quality of sorghum produced per unit area. However, in Ishongorero sub-county, information on farmer perception of the effects of *striga* weed infestations on sorghum is not known. Therefore, this study was undertaken to assess farmer perception of the effects of *Striga* weed infestations on sorghum production in Ishongorero sub-county.

Literature summary

Striga parasitism is one of the serious constraints in cereal crop growing in many regions of tropical Africa. *Striga* infests crops like sorghum, maize, millet, rice and sugarcane. However, available evidence indicates that *Striga* is more damaging in sorghum. *Striga* belongs to the family of *Scrophilariales.* Although, it is chlorophyllous, *Striga* requires a host plant like sorghum to complete its life cycle (Musselman, 1987).

Accordingly, the *Striga* weed seriously constrains the productivity of sorghum because it survives by siphoning water, photosynthates, minerals and nutrients from the crop for its growth. *Striga* causes damage to the host crop upon attachment to host roots thus, resulting it into wilting, withering, yellowing of leaves, leaf desiccation, curling, stuntedness in growth and result into less sorghum yields (Kim*.,* 1991). According to Sauerborn *et al.* (1990), *Striga* weed infests as much as 45 million hectares of small holders farm lands in the sub-Saharan Africa causing yield losses ranging from 20-80% or even total crop failures under severe infestation (Oiokeh *et al*., 2006). In fact, Ejeta (2007) estimated that the annual loss due to *Striga* weed parasitism is approximately US$7 billion which is very detrimental to the lives of over 100 million African people. Moreover, *Striga* weed is not only a biological constraint to food production in sub-Saharan Africa but also a social economic constraint to resource poor farmers (Vallance, 1995).

The problem of *Striga* has been recognised in Uganda for over 60 years with little progress in addressing it. Consequently, with the increasing demographic pressure, *Striga* infestation has gradually increased and become a threat to food production in Uganda. According to Pieterse and Verklief (1991); Parker and Riches (1993), the distribution of *Striga* is mainly determined by biophysical factors. In fact, studies done elsewhere indicate that the degree of infestation is related to the characteristics of the farming systems (Parker, 1992; Elisaba *et al.*, 1997). In addition, the low and erratic rainfall conditions predominant in the cereal growing areas of Uganda have exacerbated the *Striga* problem. For example, recent survey in Uganda indicated that *Striga* was found in 83% and 80% of the fields in Pallisa and Tororo districts, respectively. The estimated sorghum grain yield losses ranged from 60-100% (Anonymous, 1997).

The most damaging species in sub-Saharan Africa is *Striga hermonethica* which affects maize, sorghum, rice, finger millet and sugarcane. *Striga* is difficult to control as it produces numerous tinny seeds which can remain viable in the soil for up to 20 years (Worshan and Egley, 1990). In fact, *Striga* produces a lot of toxins that interfere with other crop species. Seeds are stimulated by crop exudates to germinate and infest the host crop while reproducing and increasing the *Striga* seed bank in the soil, thus; escalating the reduction of yields (Okonkwo, 2006).

Therefore, the best way to minimise the problem of *striga* is to avoid contamination during harvest and threshing of the crop or not to lay a harvested product on the ground where *Striga* weeds are transferred to the clean seeds especially those of sorghum (Esilaba *et al.,* 1997). The seeds should be cleaned before planting, prevent ruminant animals wandering from infested areas, ensure that planting materials come from a *Striga* free area, weed control should be done before six weeks. Hand puling is preferred because it poses little risk to the *Striga* plants developing just under the soil surface. Also, mechanical tillage should not be used after or when *Striga* weed has emerged out of the soil (Sand *et al*., 1990), herbicides for example Triazine or Gramaxone can be used to interfere with amino acid biosynthesis resulting in successful *Striga* control. However, the most effective control against *Striga* infestation is to avoid growing susceptible crops, abandoning of infested *Striga* areas by practicing land fallowing, use of non-host crops which stimulate *Striga* to germinate

but do not support its growth (Wild, 1998). In fact, the non-hosts can significantly deplete the soil seed bank by inducing suicidal germination of *Striga*. Non- hosts may be grown intermixed or inter sown into standing cereal crop (Parkinson *et al*., 1988).

Study description

The study was conducted in Ishongorero sub-county, Ibanda district, western Uganda during the period February and June 2013. The study was a cross sectional survey to assess farmer perception of the effects of *Striga* weed infestation on sorghum in the sub-county. The sub-county was chosen because it is one of the major sorghum growing areas in the district. All the five parishes of Rwenkobwa, Kakinga; Muziza, Rushaka and Kalangala were surveyed because of the intensity of sorghum production and *Striga* weed infestations. The target respondents were the farmers, opinion leaders, political and technical leadership in the sub county. In total, 70 respondents comprising 50 farmers, 15 political leadership and 5 agriculture officials were interviewed on farmer perception of the effects of *Striga* weed infestations on sorghum, the prevalence of striga weed infestation on sorghum, factors favouring *Striga* weed distribution, effects of *Striga* and control methods. Focused group discussions were conducted to validate the information collected from the farmers. All the data collected were summarised and entered into Excel spreadsheets and analysed using the descriptive statistics of the SPSS computer programme.

Research application

Slightly over 50% of the respondents involved in sorghum growing were married female aged 35 years or above an indication that sorghum is mainly grown by women (Esilaba *et al.,* 1997). Overall, close to 70% of the respondents had some form of education ranging from primary to tertiary level of education. *Striga* weed was encountered in all the parishes surveyed but with varying prevalence. The highest and lowest prevalence was recorded from Rwenkoba and Rushaka, respectively. However, no significant differences were observed in prevalence among the parishes of Kakinga, Rushaka and Kangara (Table 1). This finding is in agreement with Olupot *et al.* (2005), who observed that *Striga* was found in 88% of the field surveyed. This, therefore, means that *Striga* is a serious threat to small holders' agriculture. The *Striga* weed infestation and distribution was associated with a

Table 1. Prevalence of *Striga* weed in Isonghorero sub county, Ibanda district, 2013.

Parishes	Frequency (%)
Muziza	22
Kakinga	18
Rwenkobwa	30
Rushaka	14
Karangara	16
Total	100

number of factors. According to earlier studies, *Striga* is ubiquitous in most farming systems associated with intense demographic pressure and soil infertility (Parker, 1992; Esilaba *et al.*, 1997). The effects associated with *Striga* infestations on sorghum are presented in Table 3. The most commonly reported effects of *Striga* weeds were stunted growth and yield reduction as opposed to the complete death of the plants. Overall, *Striga* was reportedly devastating during the pre-flowering stage. Different control measures were employed for

Table 2. Factors favouring *Striga* weed survival and distribution in Ishongorero sub county, Ibanda district, 2013.

Factors	Frequency (%)
Production of toxins	32
Diverse mechanisms of dispersal	22
Poor methods of farming	18
Resistant underground structures	14
Inadequate farming inputs like herbicides	8
High dormancy	16
Total	100

Table 3. Effects of *Striga* weed infestation on sorghum in in Isonghorero sub county, Ibanda district, 2013.

Effects of striga weed	Frequency (%)
Stunted growth and reduced yields	44
Increased cost of production and poor quality of produce	18
Abandoning of land infested with weed	14
Death of the plant	12
Others	10
Total	100

Table 4. Control measures for striga weed in sorghum in Ishongorero sub-county, Ibanda district, 2013.

Control measures	Frequency (%)
Uprooting and crop rotation/fallowing	52
Use of herbicides	24
Early planting and mixed cropping	12
Burning	2
Nothing done	10
Total	100%

the control of *Striga* weed (Table 4). The most commonly reported practice was uprooting and crop rotation as opposed to burning. The sources of information for the *Striga* infestations were varied including school children, extension workers and fellow farmers among others. According to many authors, control of *Striga* cannot be achieved using a single method but by an integrated approach (Esilaba *et al*., 1997; Odhiambo and Ransom, 1997; Olupot *et al*., 2005).

Recommendation

Due to the devastating effects of *Striga* weed on cereal crops production, there is need for the government and other stakeholders to provide resources to develop varieties which are resistant to the *Striga* weeds. Also, since the majority of the respondents were not very conversant with the devastating effects of the weed, there is need for sensistisation and awareness creation on *Striga*, means of spread and control. Above all, there is need for an integrated control approach.

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South Africa President Ramaphosa on vote to seize land from white farmers without compensation. Farmers in South Africa claim they are being targeted in 'horrific' attacks. There are fears moves to take land from white farmers without compensation could encourage more violence. But opinions are divided on whether they are being targeted because of race.Â But the sheer brutality of the reported attacks â€“ and the growing anger of a community in South Africa that believes it is being persecuted â€“ are increasingly raising concerns. The Independent spoke to a woman who described how she was gang raped by three men who invaded her family home, and a man whose brother was gunned down at the age of 21 and said he believed race to be a factor in the killing. Read more. In Uganda 5 or 6 villages make a parish, a similar number of parishes make a subcounty, and a similar number of subcounties are collected to make a county. Using random sampling procedure, three subcounties were selected from each county and, from each of these, one parish was randomly selected. Lastly, from each selected parish one village was selected.Â Farmers in Bunya County who did not plant trees were asked to give reasons that hinder them from planting trees and, according to them, the major reasons were pests (termites), drought, lack of land, diseases (that attack mostly coffee and oranges), and lack of seeds and seedlings (Table 8). Other factors that hinder tree planting mentioned by respondents were. Weeds, in general, precede crops through the presence of dormant seeds in the soil seed bank and by germinating earlier. This, plus vigorous growth, gives weeds a distinct competitive advantage over the crop, which explains why they are major yield reducing factors. Weed seed can remain dormant for many years in the soil seed bank, whence they emerge sporadically before, together with, or after the crop.Â They are considered two of the worldâ€™s worst agronomic weeds but cocklebur is r-selected and johnsongrass is K-selected. Despite being r-selected, cocklebur has large seeds, can germinate early and late, and is a strong competitor perceive the effects of changes in climatic variables, and how they have adjusted their farming practices to cope. with the changes in climate. Place-based perceptions and farm-level coping strategies of resource-constrained. peasant farmers in Uganda are not documented. Specifically, we identified the major factors and quantified the.Â was used to select the districts and the sub-counties. Selection of the villages and parishes to be surveyed was. further guided by knowledge of local leaders and ease of accessibility. Respondents were distributed in 180. villages, 59 parishes, 17 sub-counties and six districts.Â Rainfed crop cultivation, consisting of. sorghum Sorghum sp., pearl millet. Eleusine coracana Gaertn., cassava, sesame Sesamum indicum L. and.

In Uganda, for example, a total cassava production of 3.42 MT in 1990 was obtained from 412,000 ha. Fourteen years later (2004), the production increased to 5.5 MT from 407,000 ha.Â Such variations in farmer perceptions and attitudes towards crop varieties are critical considerations when targeting to deploy improved cultivars [23, 24].Â The study was conducted in Busia district, eastern Uganda. Busia is located between latitudes 00Â°28â€²14â€³N and longitudes 34Â°05â€²31â€³E. Busia is a major cassava-farming district bordering western Kenya, an equally major cassava-growing region. Qualitative and quantitative tools were used to collect data from men, women and youth in Bulumbi and Dabani sub-counties, with specific focus on prevalence of yellow-root cassava. Farmer perception on effects of the witch weed infestations in sorghum in Ishongorero sub county, Ibanda district, south western Uganda. B Bua, C Nowamani, R Books, R OER, R SCARDA, R Tenders. Research Application Summary, 321-327, 2014. Farmersâ€™ Protests LIVE Updates: The agriculture reform bills, passed amid protests by the Opposition and BJP ally Akali Dal in Parliament this week, have triggered an India-wide resentment among farmers who fear the new legislation will do away with the Minimum Support Price (MSP).Â Why Are Farmers Protesting? Farmersâ€™ Protests LIVE Updates: Squatting on a railway track in Punjab's Amritsar as part of their â€˜rail rokoâ€™ protest, a group of farmers affiliated with the Kisan Mazdoor Sangharsh Committee went shirtless in protest against the three agri-marketing bills passed recently by Parliament. Sitting on the rail track, the bare-chested protesters shouted slogans against the BJP-led central government and demanded that the farm bills be withdrawn. He worked for MTN Uganda as a Technician for four years then later joined the marketing and sales team in Simba Telcom/Kenkom Ltd. He also worked as an administrator at Ham enterprises and then joined TREES as the driver in August 2019. 95% of the population in Edmondâ€™s home town are farmers, so he enjoys carrying this forward by working with TREES. Edmond is a comedian and has done comedy on Ugandan TV stations, radio and in theater.Â Enoch became familiar with TREES while working with 300 rural farmers in Bushika sub county, Bududa, as part of a partnership between TREES and Bushika Integrated Area Cooperative Enterprise. Enoch is passionate about working with smallholder rural farmers and quickly became interested in TREESâ€™ work. The interaction of weeding frequency and location had significant effect on cowpea dry biomass yield. The highest total dry biomass (12413 kg ha-1) was obtained in one hand weeding and hoeing at 4 WAE at Jari while the highest grain yield (4508 kg ha-1) was recorded from complete weed free under 60 cm x 10 cm spacing at Sirinka. The harvest index ranged from 18.2% in weedy check at Jari to 39.1% in weed free check at Sirinka.Â Indigenous knowledge and cowpea pest management in Sub-Saharan Africa. pp. 292â€“302. In: Singh, B. B., Mohan, R. D. R., Dashiell, K. E., Jackai, L. E. N. (Eds.), Advances in cowpea Research.Â Comparison of sorghum extracts, chemical and hand weeding management in wheat crop. Journal of Agronomy, 3 (1): 59-67. [10].