Important biotic challenges for forage development in east Africa- A report

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Introduction

By 2050, it is projected the demand for animal source foods to double (Sattari et al. 2016), a congruent increase in demand for roughages in relation to milk and meat production is equally inevitable. With livestock intensification, productive forage technologies and adaptable to both biotic and abiotic challenges are desirable to contribute to increasing roughages demand. In eastern Africa, the annual feeds demand to the tune of 1.1 million tons to cater for over 173 million heads of cattle (FAO and IGAD, 2019) continue to grow as cattle numbers increase (FAO, 2017).

Currently, there are efforts from national and international research organizations on validating and use of selected and improved forages to bolster forage production for improved livestock productivity. Among forage species with potential to increase feed resource base include species of *Urochloa* (Syn. *Brachiaria*) and *Megathyrsus* (Syn. Panicum species) (Mutimura et al., 2016; Uwe and Mwendia, 2018). However, pests and/or diseases can be a major drawback limiting benefits from such productive forages. To understand such potential threats, placing the forage technologies under real field conditions and monitor for the same produce reliable empirical evidence.

We monitored for pests and diseases in two projects, one in Kenya and the other in Tanzania each with several sites and over several seasons. The projects are (1.) *Climate-smart dairy systems in East Africa through improved forages and feeding strategies: enhancing productivity and adaptive capacity while mitigating GHG emissions* (2.) *Improved forage grasses: Making the case for their integration into humid- to sub-humid livestock production systems in Kenya and Ethiopia*

Approach

In each of the projects, we planted several forage types and replicated in each site. Over each growth cycle (largely 8 weeks) and before any harvesting, we examined all plots, on plot-by-plot basis and scored for any pest and/or disease. We adopted scoring scale of 0–5 as stipulated below;

- Pests; where 0=no insect pest, 1=few plants have insect and 5=75% of plants have insects

- Disease incidence; 0-5 where 0=no disease present, 1=few plant have disease and 5=75% of plants are diseased

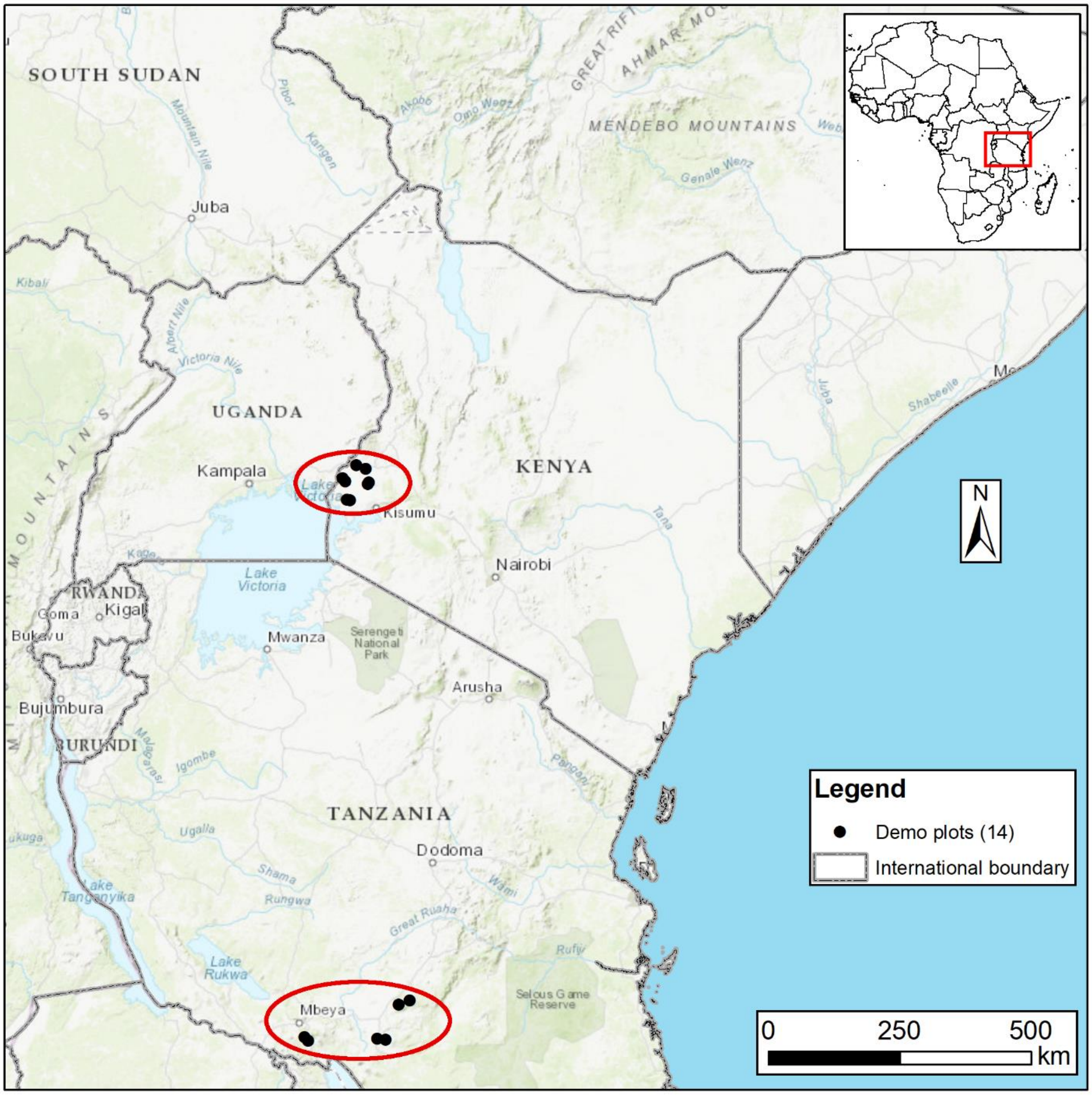

Figure 1. Forage demonstration sites in Kenya and Tanzania 2018-19

Forages involved in the projects are as summarized in Table 1

Table 1. Forage types examined for pest and diseases in Kenya and Tanzania

Project: Climate-smart dairy systems in East Africa through improved forages and feeding strategies: enhancing productivity and adaptive capacity while mitigating GHG emissions	*Project 2: Improved forage grasses: Making the case for their integration into humid- to sub-humid livestock production systems in Kenya and Ethiopia*
Brachiaria hybrid Cayman + *Stylosanthes guianensis*	*Panicum maximum* cv Tanzania
Brachiaria hybrid Cobra	*Brachiaria* cv Xaraes
Pennisetum purpureum cv Ouma + *Lablab purpureus*	*Brachiaria* cv Piata
Brachiaria hybrid Cobra + *Desmodium intortum*	*Brachiaria* hybrid - Cayman
Pennisetum purpureum cv 16835	*Brachiaria* cv MG4
Brachiaria hybrid Cayman + *Stylosanthes guianensis*	*Brachiaria* hybrid -Mulato II
Chloris gayana + *Stylosanthes guianensis*	*Brachiaria* cv Basilisk
Cayman + Desmodium	*Panicum maximum* cv Mombasa
Brachiaria hybrid Cayman	*Brachiaria* hybrid - Cobra
Chloris gayana + *Desmodium intortum*	*Panicum maximum* cv Maasai
Pennisetum purpureum cv 16835+*Lablab purpureus*	*Pennisetum purpureum* local accession
Tripsacum andersonii- Guatemala grass-	
Pennisetum purpureum cv Ouma	
Chloris gayana	

Results

Kenya

Across the eight sites located in western Kenya, neither pests nor the diseases obtained a score of more than one. Therefore, the overall scores attained represented only few plants affected in all cases. For the period in question, we did not therefore observe serious pest or disease attack for all the forages under investigation.

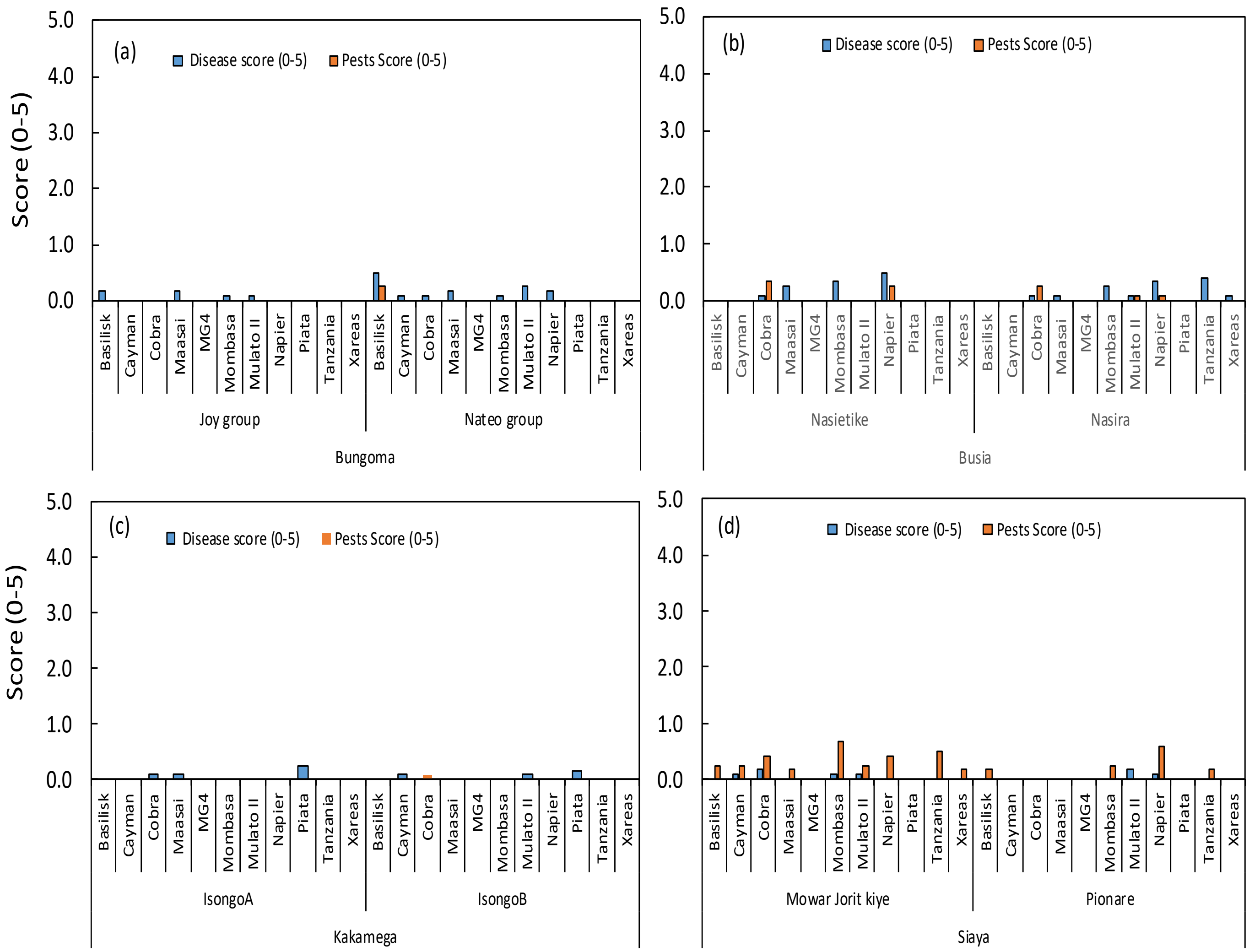

Figure 2. Mean scores (Scale 0-5) for pests and diseases across eight farmer group sites (Joy, Nateo, Nasietike, Nasira, IsongoA, IsongoB, Mowar Jorit Kiye and Pionare) in western Kenya. The data are pooled for four harvests obtained in 2019.

In Bungoma, there were different pests seen and some diseases in both sites (Joy Group and Nateo farmers groups). What appeared were fungal lesions like rust, usually predisposed by wet conditions. Fungal attacks are favored by humid environment. In Busia there was presence of rust that affected most of the Panicums though it was cutting across almost all the sites in western Kenya including, Siaya, Kakamega and Bungoma. Spider mite were also seen in Busia and Bungoma mostly affecting Mulato II and Basilisk. In Siaya (Mowar Group) during the 4^{th} harvest we had a great damage by termites and rodents that destroyed most of the lines especially the Panicums. Possibly Panicums because they produced more stems compared to leaves and termites look for fibrous material. In Kakamega, most grasses were affected by pests, but low on the scoring scale. Comparatively, we observed yellowish leaves in Panicum most likely because of high of N demand compared to *Brachiaria*. Napier stunting disease affected the Napier grass in Kakamega, Busia and Bungoma except Siaya.

Tanzania

Observes pests across the sites in Tanzania included ants, shoot flies larvae and grasshoppers. Grasshoppers appeared to feed on the leaves especially Lablab. We equally observed black and sunken spots on lablab leaves possibly also related for fungal attack.

We observed diseases largely fungal related and possibly rust characterized by brownish lesions on the leaves of Napier grass and the Brachiaria. For either diseases or pests, the pooled scores observed over the five growth cycles were largely less than one on the 0-5 scale thus posing no serious nor deleterious risk to our assessment.

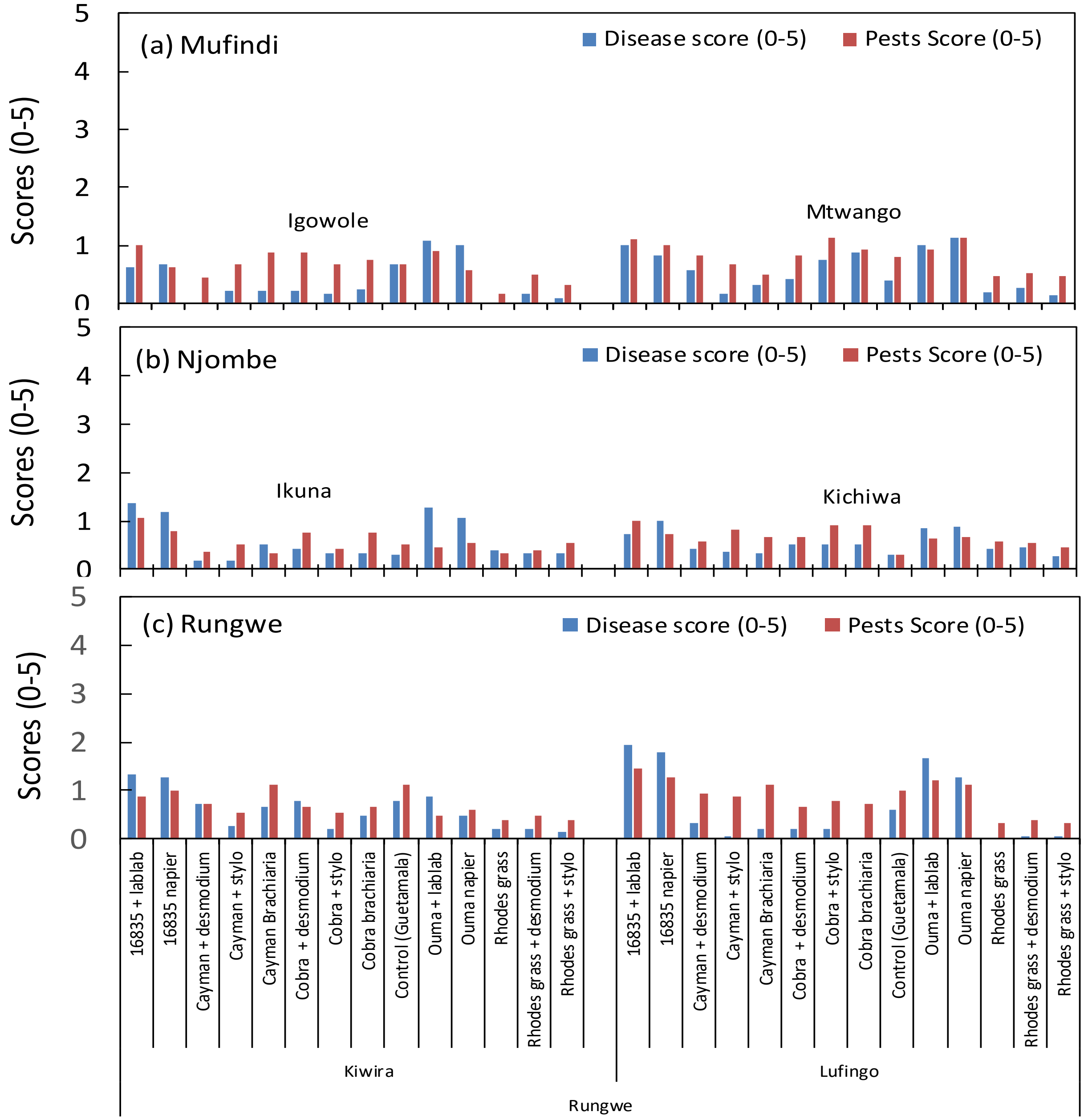

Figure 3. Diseases and pests scores on forages in six sites (Igowole, Mtwango, Ikuna, Kichiwa, Kiwira, Lufingo) in Tanzania, located in three southern districts (Mufindi, Njombe, Rugwe).

Photos

Photos from Kenyan sites

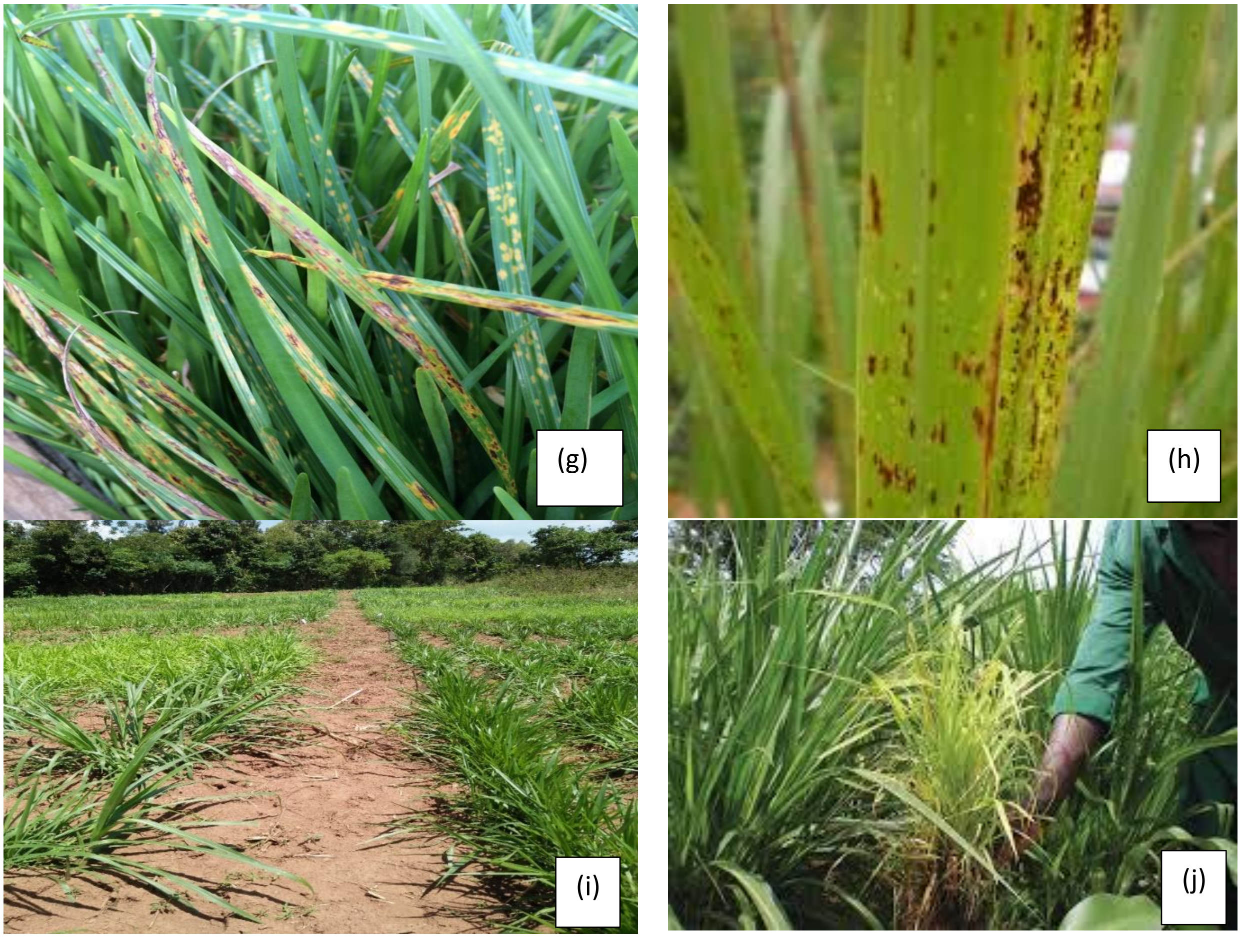

Figure 3. (a) Brachiaria hybrid Cayman during disease and pest assessment (b) Some yellowing on Mullato II on close scrutiny on the abaxial leaf surface spider mites were visible (c) Brachiaria tiller tunneled by shoot fly larvae (d) a destroyed shoot by shoot fly larvae. Dried stool of Panicum (e) following termite attack and (f) whitish brown spots on Brachiaria -Cobra leaves. Brownish lesions on Panicum leaves (g), and when we take a photo of the same closely (h). Looking at the demo (i) in perspective there are visible plots that are less green we consistently observed to be those of Panicums signifying Panicums require more N compared to Brachiaria or Napier grass. Napier stunting disease (j) attacked Napier grass only.

Photos Tanzania

Perforations on Lablab leaves by grasshoppers

Brachairia Cobra two tillers (yellowing) affected by shoofly larvae

Brachiaria Cobra tiller tunneled by Shoot fly larvae

Conclusion

Although we observed various pests and diseases symptoms, the average scores did not show grave situation of the forages affected. Shoot fly larvae appeared to affect young tillers especially of the soft materials like Brachiaria hybrids, but upon progression on growth, the stools were recovering. Fungal attack usually promoted by moist conditions, were affecting mostly the Panicums and spraying forages that are not take as high value crops is not advisable. Even if fungicide were to be applied there are chances of the chemicals entering the food chain as livestock ingest forages directly. It is noteworthy, Napier stunt that has been endemic in western Kenya was observed in Napier grass only, and we did not observe the signs of the same in Panicums or Brachiaria.

References

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