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Factors Enhancing Terrace Use in the Highlands of Kabale District, Uganda

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ABSTRACT

Terrace use was considered to be declining in Kabale highlands resulting from negative farmers' attitudes, poor care of terraces and poor extension services in fighting soil erosion. A descriptive survey, with a multi-stage sampling of 252 people investigated whether this could be true when terraces were still observed across the terrain. Summary results reveal that terraces protected over 70% of the cultivable plots against soil erosion, complimented by stabilizing the bunds using elephant grass (59%), digging across the fields (41%), and stabilizing with hedgerows (34%). Terraces were important to farmers in controlling soil erosion (93%), maintaining soil fertility (51%), and serving as boundaries between farmers' fields (40%), but management was reported to be full of drudgery (36%). Terrace destruction corresponded with redevelopment. Decisions to maintain and to redevelop terraces were made mostly by men (43.6%), rather than the women (28%). Both genders maintained the terraces (49%), but also used hired labor (41%). Continued terrace use is therefore a function of breaking down of over grown terrace bunds/risers and redeveloping them. In a sloppy area with fragmented plots, scattered land ownership, the individual farmer efforts in terrace management need to be supported by increasing the use of other soil conservation methods and practices. Women's role in terrace management needs to be supported. Further research focusing on a systems and a livelihood approach to terrace management needs to be done.

INTRODUCTION

The practice of soil conservation using terraces dates back to the pre-colonial era. Terraces were part of the indigenous and cultural ways of adapting agriculture to the steep nature of land in South-western Uganda (Lindblade, Tumuhairwe, Caswell, Nkwiine, and Bwamiki, 1996). Between 1920-1935 before any colonial administrative effort was made towards soil conservation, terrace cultivation existed; crops were grown in strips across the slopes, with intervening strips of uncleared land. The cultivable plots were sited along contours, and ridges where weeds and stones were gathered together separated the plots. After a number of seasons, the plots became regular plateau, as rains washed the earth from the higher ground against the ridges and formed terraces of reduced gradient raised above the lower fields. Use of legumes in the crop rotation and intercropping preserved soil fertility.

From 1937, soil conservation policies were put in place by the colonial administrators to address a problem of deteriorating crop yields due to soil erosion caused by the continuous cultivation of steep hillsides. Within these policies, it was recommended that ridge terraces be built at the bottom of the plot running along the contour, use of hedges or elephant and other grasses, contour rows of mulch, weeds and crop debris which helped the terrace to form. A network of chiefs through information meetings and demonstrations implemented the measures.

Between I940 - 1955 - termed the Purseglove era, named after Purseglove the then District Agricultural Officer who played an important role in formalizing and reorganizing soil conservation in the area, the colonial government intensified soil conservation to address escalating soil erosion and low productivity problems in the region. Strict implementation of the standard measures was through a combination of coercive measures, and persuasion, incentives in form of education, demonstrations and propaganda ensured by the native authorities the chiefs (Lindblade et.al.,1996). Failure to implement the measures led to either fines or short-term imprisonment. Measures promoted included terraces, use of strips of grass between plots, contour bunds, strip cultivation, check dams, afforestation of steep slopes, and the use of elephant grass bunds (Christiansson, Mbegu & Yrgard, 1993; Twesigye and Bagoora, 1991).

On the contrary Kakuru and Peden (1991), and Tukahirwa (1991), indicated that many terrace risers had been destroyed and others were given little care. The risers had been destroyed to access more fertile portions of the terraces, to control rodents, or reduce landslides. Twesigye and Bagoora (1991) reported that coercive approaches used to enforce use of terraces, made farmers develop a negative attitude towards the measures causing a decline in soil conservation generally in the post colonial period (1962 -). How true were the above reports on poor terrace use when many terrace structures are observed across the highlands of Kabale? What practices enhanced continued terrace use, and what household gender labor and decision-making existed in terrace management?

This paper explores the factors that affect the continued use of terraces in general but specifically establishing the: (1) proportion of farmers land protected by terraces, (2) factors explaining terrace maintenance.

METHODOLOGY

Kabale District is located in southwestern Uganda between latitudes 1ºS and 1º30"S, and longitudes 29º18"E and 30º9" E. The altitude ranges between 1500 - 3000 meters above sea level, with a temperate like climate, a mean annual rainfall of between 1,000 and 1,500 mm of rain, and temperatures ranging from 10 to 23ºC. The District is in mountainous and undulating hills with steep convex slopes of 10–60º and gentle slopes of 5-10º nearer

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the swampy valleys formerly occupied by papyrus swamps (Kabale District Department of Meteorology, 1997; Lindblade et al., 1996). It has a high population density of 250 - 279 persons per square kilometer of land and 779 persons per square kilometer of arable land area (Okorio, Hoekstra, Byenkya, and Otara, 1988).

A descriptive survey was conducted in Kabale District, August 1996, with a target population of persons classified as agricultural workers in the 1991 Uganda Population Census report numbering 122,593. A multistage purposive sampling design was used covering the 3 counties of Kabale district, 2 sub-counties per county, 2 parishes per sub-county, and between 2 - 4 villages per parish depending on the population of the county. At the village level, alternate sampling recommended by CIMMYT (1993) in cases where a sampling frame cannot be got, was used. Three (3) farm households to the left and right of the village chairperson's house were selected. For each of these directions, one house was skipped then the next one chosen. The sample size was 252 for the entire district, a figure that fell in the sample sizes (200-500) that had been averagely drawn for regional or special areas with none or few subgroup analyses (Donald & Hawkins, 1987).

Fourteen well-trained interviewers administered the questionnaire composed of closed-ended questions. A panel of experts established its content validity. The questionnaire was translated from English into the local dialect - Runyankole-Rukiga and pre-tested with 32 farmers outside the sampled study areas. The interviews were conducted in the local dialect. The recovery rate for the study was 96.4% bringing the number of respondents to 243. Data were coded, entered, and analyzed using the Statistical Package of Social Scientists (SPSS) program (Version 6.1 for Windows) for descriptive statistics of frequencies, percentages, and means.

RESULTS

The proportion of farmland protected by terraces

The proportion of the farmers' land protected by terraces and other soil conservation methods (Table 1) was established by dividing the number of plots protected by a given method as given by the farmer, by the total number of plots the farmer indicated to own. An average coverage for each method was obtained for all the farmers.

Terraces protected the highest proportion of plots (0.73), followed by tree planting (0.28), use of trashlines (0.16), fallowing (0.11), and trenches (0.10).

Factors in terrace maintenance

Farmers' practices in maintaining terrace benches and bunds (Table 2) included: stabilizing of terrace bunds with elephant grass (59%), digging across the bench (41%), stabilizing with hedges (34%), fallowing (20%), stabilizing with a combination of elephant grass and other grass types (6%), and reducing band height (5%). The impetus to maintain terraces arose from the need to control soil erosion (93%), maintain soil fertility for good crop yields (51%), separate own plots from their neighbors (40%), be able to grow a wide variety of crops (7%), and have feeds for the livestock (2%) (Table 3). Discouraging factors to terrace maintenance were: the drudgery involved in the maintenance (36%), rodent pest problems (30%), and the high terrace maintenance/management costs related to hired labor (17%). Bund destruction by livestock (13%), lack of labor within the family to manage the terraces (12%), and neighbors encroaching on other's land (8%) also discouraged the farmers from maintaining the terraces. Farmers with neighboring plots tend to dig the other's terrace riser so as to spread the good fertile soil, which would have accumulated at the riser.

Sixty three percent (63%) of the farmers who used terraces had ever destroyed the bunds, while 37% had never. Twenty eight percent (28%) of the respondents had destroyed bunds in search for fertile soils (Table 4), while 21% were planning to construct a new band, and 17% were joining two neighboring plots and removing bunds that were collapsing. Others destroyed to remove rodent hiding places (15%), destroy weeds on bund (9%), reduce the bund height (7%), and avail more farmland (4%).

Women in the Kiga society do not own land; it is the men who own it. As a result, women cannot make effective decisions about soil resource management. The men, as land owners, make decisions on how to use the

Table 1. Average proportion of respondent's plots protected by the different soil conservation methods.

Type of soil conservation method	Proportion
Terraces	0.73
Tree planting	0.28
Trashlines	0.16
Fallowing	0.11
Trenches	0.10
Use of compost manure	0.08
Hedgerows	0.06
Mulching	0.05
Elephant grass strips	0.04
Use of cover crops	0.04
Contour cultivation	0.03
Circular soak pits	0.02
Strip cropping*	0.01
Mixed cropping*	0.01
Crop rotation*	0.01

Table 2. Practices used by farmers to maintain terraces (n=243).

Practice	Percentage response (%)
Stabilizing with elephant grass	59.3
Digging across the bench	40.7
Stabilizing with hedgerows	34.2
Fallowing	19.8
Stabilize with other grass types and elephant grass	5.8
Reducing the height of the riser/bund	5.4
Stabilizing bunds with grass	4.9
Ensuring crop cover	4.1
Redeveloping terrace bunds	3.3
Planting trees at the bunds	1.7
Fencing of boundaries	0.8
Leaving mid-plot elephant grass	0.4
Intercropping	0.4

*The very low farmer response to these methods shows that farmers mainly know them as soil fertility improving methods and not as soil conservation measures. This situation may otherwise be misinterpreted to mean that the farmers practice monoculture farming, which is not the case.

Table 3. Factors that encouraged and discouraged farmers in maintaining of terraces (n=243).

Encouraging factors	%	Discouraging factors	%
Adequate soil erosion control	92.6	Work is very tedious	36.2
Maintaining soil fertility	51.4	Rodents and moles that hide in bunds	28.8
Act as boundaries with neighbors	39.5	Loss of land to the band	16.5
Can grow a variety of crops	7.4	High maintenance costs	16.5
Elephant grass grown on the Bunds is used for feeding cattle	2.1	Bunds destroyed by cattle	12.8
Collapsing of Bunds is reduced	1.3	Inadequate household labor	12.4
Elephant grass grown on Bunds is used for house construction	0.4	Neighbors encroach on the Bunds	7.8

Table 4. Farmers reasons for destroying terraces (n=243).

Reasons	Percent (%)
Search for fertile soils	28.0
Planned to construct a new terrace band	20.6
Joining plots	17.3
Removing a band about to collapse	16.9
Destroy hiding places of rodent pests	15.6
Destroying bad weeds	8.6
Reducing the bank height	6.6
Need to avail more land	4.1
Lack of value for the terrace Bunds	2.9
Construction of a house	1.7

Table 6: Sources of labor for maintaining the terraces (n=243).

Person	Percentage (%)
Father	46.9
Mother	46.5
Hired	40.7
Children	27.6
Co-operative work group	9.6

Table 5. Decision makers for both the redeveloping and maintenance, only the redeveloping and for the maintaining of terraces (n=243).

Both redeveloping and maintaining of terraces		Redeveloping of terraces only		Maintaining of terraces only	
Decision Maker	**%**	**Decision maker**	**%**	**Decision maker**	**%**
Father	43.6	Father	7.8	Mother	14.8
Mother	28.4	Neighbor	2.9	Father	1.6
Family consensus	18.5	Mother	1.2	Neighbor	1.6
Children	1.2	Family consents	0.4	Family consents	1.2
Co-operative work group	0.4			Hired labor	0.8
Local council chairman	0.4			Children in the home	0.8
Neighbor	0.4				
Hired labor	0.4				

land, but do not implement them as they are not available to guide the women who work the land (Tukahirwa, 1991).The study sought to understand the dynamics of gender decision making and labor provision within the household in the management of terraces. Forty-four percent (44%) of the farmers indicated that fathers decided on both the redeveloping and maintenance of terraces, 28% gave mothers, and 19% gave the entire family (Table 5). There was minimal decision making for redeveloping of terraces as a single activity, 8% of the farmers said it was the fathers who decided, 3% said it was the neighbors (possibly because most farmers plots are next to their neighbors') 1% said it was the mothers to decide while 0.4% said the entire family decided. Fifteen percent (15%) of the farmers indicated that mothers decided on the maintenance of terraces as a single activity, while 2% said it was the fathers and the neighbors. Forty-seven (47%) indicated that the men provided labor for maintaining the terraces; a similar proportion indicated that women did provide labor for maintenance. Hired labor (41%), children (29%), and co-operative work groups (9%) were the other sources of labor for terrace maintenance (Table 6).

DISCUSSION

With over seventy percent of the plots protected against soil erosion by terraces, the prevalent importance of terraces in the area in controlling erosion is revealed. The annual crop based farming system, which entails frequent soil disturbances through cultivation, increasing soil frailty, erosion and running down of the terrace riser supports the need to properly manage the terraces. The high proportion of plots covered by terraces is traced to the indigenous soil and water conservation measures of the farmers as well as their compliance with the modifications and standardization brought later by the colonial administrators in the 1940s (Lindblade et al., 1996). Farmers have for long integrated the practices involved with terrace management, through breaking down and redeveloping of the terrace bunds/risers. The major concern of farmers should be in soil nutrient recapitalization which is possible through integrated nutrient management, a practice related to the indigenous system of agriculture that ensured sustainability of the resource base through the use of legumes (Caswell, in press).

There were many other soil conservation practices/methods that the farmers used. However there seems to be differences in the methods and practices used from field to field and from farmer to farmer. This concurs with what Siriri, Zake, Raussen and Tenywa, (in press) observed, that there were high field variations due to the different farmer management practices. Thus, terraces are likely to be managed variably by different farmers depending on the time period of using them, the size of the land, the knowledge, attitudes and skills possessed on terrace management (Miiro and Tibezinda, 1998). The position of the farmer's field on the slope and closeness to homestead may also affect the level of terrace management and the kind of soil conservation measures the farmer is able to use. Fields that are far away from home are likely to have more fallows than those that are near.

Most of the practices in terrace management given aimed at stabilizing the terrace bund and protecting the cultivable terrace bench from soil erosion. The terrace bund is a part most prone to destruction and thus spilling over soil to a neighboring plot, which may belong to another farmer. Practices that protected the terrace bench from soil erosion included digging across the fields, fallowing, ensuring crop cover, use of mid-plot grass strips and intercropping. These also enhance soil fertility at the terrace bench, by increasing the amount of organic matter thus improving the soil structure, water retention capacity, and the release of nutrients to the plant (Siriri et al., in press; Greenland, 1981).

The practice of breaking down the terrace is usually to redistribute the fertile soil that collects over time at the terrace bund all over the terrace bench, but also to avoid the riser from becoming too high to manage (Miiro and Tibezinda, 1998). Lower terrace sections have higher values of nitrogen, organic carbon, and a loamy texture with higher water retention and bulk density (Siriri et al., in press). The redistribution of the fertile soil at the bund without deliberate use of soil inputs for crop yield improvement all over the terrace bench can, in the long run, reduce the total fertility available. It may be possible that an area, which is well managed, may have its terrace bunds less broken by surface runoff (Norman, 1986).

In the long run, not very many more terraces would necessarily have to be developed in the already extensively and intensively cultivated, terraced land. However with the already dense population (over 250 persons per square kilometer), and the high level of land fragmentation in the area, judicious practices of redeveloping the terraces will have to continue in the area but they should be supported by the use of integrated soil fertility and water conservation measures, such use of compost, farm yard manure, improved fallows and use of grass strips (Lindblade et al., 1996). With 66% of the plots occupying the hillside, and the difficulty posed by managing fragmented land, the above practices remain a priority, and the issue of complimentality of technologies arises, with no single technology functioning on its own, but in combination with others.

Elephant grass *(Pennisetum purpureum)* was a common plant in stabilizing the terrace bunds. Its use dates back in the early days of colonial intervention in soil conservation in Kabale. Mr. McCombe one of the District Agricultural Officers of the then Kigezi district for 1941/2 observed that 'Kigezi had an established system of planting elephant grass on the contour and what I have introduced is an addition to and not a disturbance of its older system' (Caswell, in press). Elephant grass is also known to increase soil fertility particularly the addition of potassium nutrients to the soil through its debris. It is also a livestock feed. The low indication of its use as a livestock feed is probably due to the low deliberate use of elephant grass in form of cut and carry and its apparent use in house construction. It was mostly freely grazing animals, which fed at the bunds (usually overgrown with several grass weed species including elephant grass) that destroyed the terraces due to the trampling. While it is a common practice for animals to be freely grazed on the terraces during dry seasons, farmers do not like the breaking of terrace risers by the animals, which are sometimes likely to belong to someone else.

The percentage response per factor that discourages farmers from maintaining their terraces was low that is less than 40% (Table 3) possibly due to individual differences in managing the terraces. Table 5 therefore shows that there were more responses on farmers deciding to carry out maintenance and redeveloping terraces than responses for deciding on maintenance only, and redeveloping only put together. The reason for this may be that both redeveloping and maintaining of terraces are perceived as complimentary in terrace maintenance.

CONCLUSIONS

The use of terraces in controlling erosion is still very important to individual households in Kabale District, as shown by the high percentage of use of terraces. However, terraces are complimented by other soil conservation methods and practices including among others tree planting, and use of trashlines. Farmers indicated that stabilizing bunds was the most important practice in maintaining of terraces using elephant grass, hedgerows, or any other type of grass. Digging across the terrace to prevent exposure of the cultivated furrows to the direction of the run-off, and fallowing were also important practices in the maintenance of terraces.

Adequate control of soil erosion was the main factor that encouraged farmers to maintain the terraces followed by the need to maintain soil fertility, and the boundaries between plots of different owners. The drudgery of terrace maintenance, rodent crop pests hiding in bunds, loss of good soil to the bund, livestock feeding from the bunds and on crops in the fields, and uncooperative field neighbors, were the discouraging factors to maintenance of terraces.

Destruction of terrace bunds was a normal, but occasional practice (not many farmers had frequently destroyed the terraces), usually followed by the redevelopment of new bunds, what Braun, Smaling, Muchungu, Shepherd and Corbett (1997) called progressive terrace formation. The redevelopment is seen as a flexible form of soil conservation management and not necessarily a static approach to soil conservation. Other causes of terrace destruction were the need to access fertile land accumulated at the bund, or to join two neighboring fields plots, destruction of rodent caves and bad weeds at the bunds. The men were the main decision makers for both redeveloping and maintenance of terraces, followed by the women. However, both men and women equally provided labor for managing the terraces, and hiring of labor was an important investment. Most households made decisions for redeveloping and maintaining of terraces than each practice singly.

RECOMMENDATIONS

To enhance farmers' continued use of terraces, there is need to ensure increased use of other soil conservation methods that compliment the use of terraces among farmers. Vegetative soil erosion control or non-physical conservation should be emphasized as a viable alternative. Use of improved fallows, legume cover crops (Canavalia, Lablab), and multi-purpose agro-forestry tree species. Guatemala, Lemon and Vetiver grasses can be used to stabilise the bunds, while trees like Alnus species, Sesbania trees, Calliandra incorporated with inoculated soybeans can restore soil nitrogen, provide crop-cover, rejuvenate soil fertility, fetch higher income, and hold the soil firmly together (Berhe, 1996; Phillips, 1996; FAO, 1993a). Vegetative soil conservation eases farm work saving labor (use of grass strips is ten times less labour intensive than physical soil construction measures), increased yields, and reduced risks (Braun et al.,1997, FAO, 1993b). Trenches, , grass strips, soak pits, can be structural options. A history of successful implementation of soil conservation measures exists implying better opportunities for successful and sustainable use in this period (Caswell, in press; Miiro and Tibezinda, 1998).

Further study is needed on the complimentality of soil fertility and soil conservation practices in terrace management as well as the efficiency of terraces in controlling soil erosion. These should take a systems perspective, and should be related to the demographic, socio-economic status, policy, institutional, extension methodologies including participatory extension, community roles, systems, historical and cultural factors. The role of terrace management in poverty alleviation in highland areas from a livelihoods perspective, showing the reciprocal contributions of the natural, physical, financial, human and social capital assets could be another thrust. Increasing the most related capital asset(s) to terrace management might contribute to their sustainable use.

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REFERENCES

Berhe, W.A. 1996. Twenty years of Soil Conservation in Ethiopia. A personal overview. SIDA - RSCU, Nairobi 24 pages.

Braun, A.R., E.M.A. Smaling, E.I. Muchungu, K.D. Shepherd and J.D. Corbett. 1997. Maintenance and improvement of soil productivity in the highlands of Ethiopia, Kenya, Madagascar and Uganda. AHI Technical report Series No.6. Africa Highlands Initiative, ICRAF, Nairobi 129 pages

Caswell, G. 2000. Soil conservation policies in Kigezi, Uganda: Successful implementation and absence of resistance In Beinart, W. and J., McGregor, (eds.). Social History and African environments (Heinemann and James Currey, in press).

Christiansson, C., A.C. Mbegu and A. Yrgard. 1993. The Hand of Man. Soil Conservation in Kondoa Eroded Area, Tanzania. Regional Soil Conservation Unit RSCU Nairobi. 55 pages.

CIMMYT. 1993. The Adoption of Agricultural Technology: A guide for survey Design. pp 29 - 35

Donald, S.T. and D.I. Hawkins. 1997. Marketing Research. Measurement and method. pp 397. Macmillan Publishing House, New York.

FAO. 1993a. Agro-ecological assessment for National Planning: The Example of Kenya. (pp. 45, 46). Food and Agriculture Organization of the United Nations FAO Rome.

FAO. 1993b. Towards Sustainable Agriculture. The Conservation and Rehabilitation of African lands. An International Scheme. ARC/90/4. W/Z5700E/3/2.93/ 1000 Food and Agriculture Organization of the United Nations Words and Publications, Oxford. 38 pages.

Greenland, D.J. 1981. Characterization of Soils. In Siriri, D., J.K. Zake, T. Raussen and M.M. Tenywa (in progress). Crop and Soil variability on terrace benches in the highlands of Uganda. Accepted by the Agriculture Ecosystems and Environmental Journal.

Kabale Meteorology Department. 1997. Monthly and annual weather data for Kabale District. Uganda Ministry of Natural Resources.

Kakuru, A. and D. Peden. 1991. Can contour hedgerows control soil erosion on steep lands of Southwest Uganda? In Zake, J.Y.K., J.K. Tumuhairwe, V. Ochwoh, J.S. Tenywa, C. Nkwiine, S. M. Ssesanga, T. Hyuha, E.N.B. Nsubuga (eds). Proceedings of the Eleventh Annual general meeting of the Soil Science Society of East Africa conducted in Mukono, Uganda.

Lindblade, K., J.K. Tumuhairwe, G. Caswell, C. Nkwiine and D. Bwamiki. 1996 More People More Fallow: The Myth of overcultivation in Kabale District, Uganda. (Unpublished project report). pp 7- 18, 29 - 56.

Miiro, R. and J. Tibezinda. 1998. Factors that affect the sustainability of terraces in Kabale district. Makerere University Agricultural Research Institute Kabanyolo (MUARIK) Bulletin. Vol. 1.51-56.

Norman, H. 1986. Soil conservation. In Siriri, D., J.K. Zake, T., Raussen and M.M., Tenywa (in press). Crop and Soil variability on terrace benches in the highlands of Uganda. Paper submitted to the African Crop Science Journal.

Okorio, J., D. Hoekstra, S. Byenkya and J. Otara. 1988. Agro-forestry Research Project Proposal for the Kigezi annual Food crop system in the Highlands of Uganda. AFRENA Report series No.11. Nairobi

Phillips, F. 1996 Recommendations for Improved Land Management in Kashasha, Kabale CARE/DTC Report. Unpublished technical report pp. 1.

Siriri, D., J.K. Zake, T. Raussen and M.M. Tenywa (in progress). Crop and Soil variability on terrace benches in the highlands of Uganda. Accepted by the Agriculture Ecosystems and Environmental Journal.

Tukahirwa, J.M. 1991 Participation of Women is soil erosion control. A Case study in Kabale District Uganda. In Zake, J.Y.K., J.K. Tumuhairwe, V. Ochwoh, J.S. Tenywa, C. Nkwiine, S.M. Ssesanga, T. Hyuha, E.N.B. Nsubuga (eds). Proceedings of the Eleventh Annual general meeting of the Soil Science Society of East Africa conducted in Mukono, Uganda.

Twesigye, C. and F.D.K. Bagoora, 1991. A study of accelerated erosion in Rwamucucu sub-county, Eastern Kabale District. In Zake, J.Y.K., J.K., Tumuhairwe, V., Ochwoh, J.S., Tenywa, C., Nkwiine, S. M., Ssesanga, T., Hyuha, E.N.B., Nsubuga (eds). Proceedings of the Eleventh Annual general meeting of the Soil Science Society of East Africa conducted in Mukono, Uganda.