

Indigenous knowledge in utilization of local trees and shrubs for sustainable livestock production in central Tanzania

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Summary

Questionnaire surveys were conducted in Singida and Dodoma regions (Semi arid Central Tanzania) in order to assess the potential of crop residues and natural vegetation as ruminant feeds during the dry season. Results obtained in relation to utilization of local trees and shrubs for livestock production indicate that *Acacia tortilis*, *Dichrostachys cinerea* and *Ecchorium* species were some of the trees and shrubs well known to farmers and highly utilized in livestock feeding as indicated respectively by 73%, 40% and 20% of the respondents (n=121). Efforts of conserving many trees and shrubs were, however, very poor since only 12% of the respondents (n=121) established and managed some of these trees for livestock feeding. Other uses of local trees and shrubs such as treatment of animal diseases or disorders as well as treatment of some animal products such as milk into concentrated products are highlighted. Suggestions for efficient utilization of these endangered resources for sustainable livestock production under smallholder farmers' conditions are given.

KEY WORDS: Trees, shrubs, livestock, tropics, species, feed

Introduction

Trees and shrubs are of value in agriculture as they directly or indirectly contribute to crop and livestock production. They provide fodder to animals and replenish soil fertility. Similarly, they are useful to people when they provide wood for various purposes, when used in human and veterinary medicine and also for environmental conservation. Appreciable work has been done on *Leucaena* species (Skerman 1977). Similarly, a lot of work has been done on *Sesbania* species (Kategile and Adoutan 1993). Attempts to increase knowledge on exploitation of these two species and many of the trees and shrubs locally found in tropical Africa have also been discussed by Atta-Krah (1989) and Lamprey *et al* (1980). The aim of this paper is to highlight the current state of knowledge on utilization of different local trees and shrubs among agro- pastoralists in the Dodoma and Singida regions, in the semi-arid zone of Central Tanzania.

Study methodology

Formal surveys were conducted in Singida and Dodoma regions in 1991 and 1993 dry seasons, respectively as part of the diagnostic phase for the implementation of the project "The potential of crop residues and natural vegetation as ruminant feeds during the dry season in Central Tanzania". These surveys followed the

informal surveys done in both regions in 1991 and 1992 respectively. After the informal surveys, the regions were divided into clusters based on climate and other aspects of the farming system (Goromela *et al* 1993). The regions are in the semi-arid zone.

A total of 153 structured questionnaires were developed and used. Only the crop/livestock farmers from the selected villages were interviewed. The respondent was the household head. Information from the questionnaire, related to utilization of trees and shrubs and other natural vegetation, were coded and summarised using a pocket calculator. Only 121 questionnaires were used in the analysis after data scrutiny.

Results and discussion

Utilization of trees/shrubs for livestock feeding

The interviewed farmers (agro-pastoralists) were able to identify which tree/shrubs species and which vegetative part was favoured by which class of livestock (Table 1). The farmers, however, named these trees and shrubs in their vernacular language (Appendix 1).

Table 1: Knowledge on utilization of some tree/shrubs species for livestock feeding in Central Tanzania

Tree/shrub species	Respondents (Percentage)	Animal species	Favoured plant parts
<i>Acacia tortilis</i>	73	Cattle, sheep, goats	Pods Leaves
<i>Acacia mizera</i>	7	Sheep, goats	Leaves
<i>Acacia albida</i>	7	Cattle, sheep, goats	Pods, Leaves
<i>Adansonia digitata</i>	2	Goats	Fruits
<i>Brachystegia sp</i>	7	Cattle, goats	Leaves
<i>Commiphora sp</i>	2	Cattle, goats	Leaves
<i>Boscia indica</i>	17	Cattle, goats	Leaves
<i>Delonix elata</i>	5	Cattle, goats	Leaves
<i>Dichrostachys cinerea</i>	40	Goats, cattle	Leaves, Fruits
<i>Ecchorium sp</i>	20	Cattle	Leaves
<i>Ficus sp</i>	3	Goats	Leaves
<i>Grewia bicolor</i>	3	Goats, cattle	Leaves
<i>L. leucocephala</i>	10	Cattle, sheep/goats	Leaves
<i>Markhamia zanzibarica</i>	3	Cattle, goats	Leaves
<i>Solanum sp</i>	5	Goats	Flowers
<i>Watheria sp</i>	2	Cattle, goats	Leaves
<i>Ziziphus mucronata</i>	2	Cattle, goats	Leaves

Note: Total is > 100% due to multiple responses.

Appendix 1: Some Trees/Shrubs used as fodder in Central Tanzania

Local Name

(Kigogo)	Botanical Name	Family
Mbilimisi	<i>Erythrina obyssinica</i>	Papilionideae
Mbukwe	<i>Terminalia stuhlmanni</i>	Combretaceae
Mbanhumbwahu	<i>Canthium sp.</i>	Rubiaceae
Mdejedeje	<i>Acacia seyal</i>	Mimosoideae
Mdonho	<i>Commiphora stuhlmanni</i>	Bursecaceae
Mfuku	<i>Acacia nilotica</i>	Mimosoideae
Mgombwe	<i>Brachystegia sp</i>	Caesalpiniaceae
Mgonandela	<i>Acacia royumae</i>	Mimosoideae
Mguji	<i>Brachystegia sp</i>	Caesalpiniaceae
Mguwoguwo	<i>Markhamia obtusifolia</i>	Bignoniaceae
Mkakatika	<i>Cassia orbreviata</i>	Caesalpiniaceae
Mkambala	<i>Acacia meuiifera</i>	Mimosoideae
Mkata kivimbi	<i>Vepris glomerata</i>	Rutacea
Mkola	<i>Afzelia quanzinsis</i>	Caesalpiniaceae
Mkore	<i>Grewia bicolor</i>	Tiliaceae
Mkuliza	<i>Maerua angolensis</i>	Capparidaceae
Mkunguni	<i>Salvadora persica</i>	Salvadoraceae
Mkungugu	<i>Acacia tortilis</i>	Mimosoideae
Mkutani	<i>Albizia anthelmintica</i>	Mimosoideae
Mmemenhamene	<i>Allophyllus africana</i>	Sapindaceae
Mnyangwe	<i>Ziziphus mucronata</i>	Rhamnaceae
Mpela	<i>Adansonia digitata</i>	Bombaceae
Mperemehe	<i>Grewia platyclada</i>	Tiliaceae
Mrumba	<i>Ficus sp</i>	Moraceae
Msanze	<i>Premna sp</i>	Verbenaceae
Msasi	ang <i>Dombeya shumpangae</i>	Stalculiaceae
Msingisa	<i>Boscia ustifolia</i>	Capparidaceae
Msusuna	<i>Grewia burtii</i>	Tiliaceae
Mtafuta	<i>Grewia sp</i>	Tiliaceae
Mtalawanda	<i>Markhamia zanzibarica</i>	Bignoniaceae
Mtindilihala	<i>Maerua sp</i>	Capparidaceae
Mtumba	<i>Boscia grandiflora</i>	Capparidaceae
Mtumba	<i>Boscia indica</i>	Capparidaceae
Mtundulu	<i>Dichrostachys cinerea</i>	Mimosoideae
Mturatura	<i>Solanum sp</i>	Solanaceae
Mube	<i>Cassiopourea mollis</i>	Rhizophoraceae
Mvugala	<i>Acacia sp</i>	Mimosoideae
Mvumvu	<i>Cadaba farinosa</i>	Capparidaceae
Mwiliganza	<i>Acacia albida</i>	Mimosoideae
Mwima chigula	<i>Maerua angolensis</i>	Capparidaceae
Mwolowolo	<i>Calyptrothea taiensis</i>	Portulaceae
Mzaza	<i>Acacia senegal</i>	Mimosoideae
Mzejezeje	<i>Sapium bussei</i>	Euphorbiaceae

Acacia tortilis was the most known tree species as indicated by 73 percent of respondents (n = 121). Some

farmers collect pods of this tree species (including those of *Acacia albida*) and keep them at their homes for the purpose of feeding calves and sick animals which can not walk long distances in search of feed and water during the dry season. Unfortunately, no grinding or any other physical treatment was reported to be practised for the purpose of improving the nutritive value of the pods. Reasons given to the question as to why they do not grind the pods varied. Some indicated that the work is laborious especially for those with large herds of cattle. However, the majority did not know if this could be of value in feeding practices. Apart from *Acacia tortilis*, *Dichrostachys cinerea* was reported to be known and used by 40% of respondents (n = 121). Its fruits and leaves were reported to be favoured particularly by small ruminants. Other high ranking species were *Ecborium* species and *Boscia indica* whereby 20 and 17 percent respectively of all the respondents knew and utilized the species in livestock feeding.

The response given by the interviewed farmers on their experiences on utilization of various trees and shrubs were comparable to observations made by Backlund and Bellskong (1991) who closely followed the herds of livestock grazing in selected farms in Mpwapwa district, Dodoma region.

Veterinary use of trees and shrubs

Some trees and shrubs are utilized by agro-pastoralists in treatment of animal diseases and disorders (Table 2). For example, the stem of a climbing plant "Mtakalang'onyo" (*Euphorbia sp.*) is pounded and mixed with water. The material is squeezed out into the reproductive tract of a cow leaving the mother liquor to induce the expulsion of the retained placenta. On the other hand, *Maerua edulis* and *Boscia grandiflora* leaves are used in treatment of some poultry diseases.

Table 2: Veterinary use of some trees and shrubs

Tree species	Animal	Comments
<i>Euphorbia sp</i>	Cow	Stem pound and mother liquor used (Mtakalang'onyo) to expel retained placenta.
<i>Stegnotaenia araliaceae</i>	Cattle, Goats	Leaves mixed with water to treat diseases characterised by difficulties in breathing.
<i>Maerua edulis</i>	Poultry	The roots of <i>M. edulis</i> are mixed with leaves of <i>B. grandiflora</i> to treat poultry diseases.
<i>Boscia grandiflora</i>	Poultry	

Treatment of livestock products

Some farmers use trees and shrubs to preserve livestock products such as milk. Wood from some of the trees/shrubs (Table 3) is burned and produces smoke that is forced into gourds used to store the milk. This smoke

is believed to increase the shelf life of milk and to impart desirable flavours to the "clotted" and concentrated product. Studies conducted at Sokoine University of Agriculture (SUA) on traditional smoking of milk practised by different tribes in Tanzania show that smoke treatment inhibits growth and activity of mesophilic and thermophilic lactic acid bacteria, although the treated product might not be favoured by everybody tasting the milk (Chenyambuga *et al* 1993).

Table 3: Trees used for smoking of milk in Central Tanzania

<i>Boscia angustifolia</i>	<i>Boscia grandiflora</i>
<i>Capparis fascicularis</i>	<i>Euphorbia candelabrium</i>
<i>Maerua angolensis</i>	<i>Maerua parvifolia</i>
<i>Mundulea sericea</i>	

Establishment of trees and shrubs

Very few farmers in the surveyed areas established local trees for animal feeding and/or for any other purposes, for example for fuel. Some farmers, however, kept a few stands of trees near their homes or in their fields (especially *Acacia tortilis*) although they did not plant them. These people kept the trees purposely for shade. *Ficus* species (Mirumba), *Morus* species (Mulberry trees) and *Leucaena leucocephala* were established near homesteads according to 12% of the respondents (Table 4).

Table 4: Establishment of some trees and shrubs for fodder in smallholder farms in Central Tanzania

Tree species	Respondents	
	n	%
<i>Acacia sp.</i>	0	0
<i>Dichrostachys cinerea</i>	0	0
<i>Ficus sp.</i> (Mirumba)	2	2
<i>Leucaena leucocephala</i>	7	6
<i>Morus sp.</i> (Mulberry trees)	5	4
Total	14	12

Total number of respondents was 121.

The main reason given for giving little or no effort to establishment of the local tree and shrub species was the slow rate of growth of these trees/shrubs. Similar comments were made by Atta-Krah (1989). Unfortunately, the faster growing shrubs such as *Morus* species (Mulberry trees) were not widely grown for

unspecified reasons.

On the other hand, in areas where social development and research institutions have introduced zero-grazing technology, farmers are encouraged to establish some browse species for livestock feeding and for other multiple uses. In Mvumi Division, Dodoma Rural District (Dodoma region) the Diocese of Central Tanganyika (D.C.T- Anglican Church) in collaboration with the Soil Conservation Project in Dodoma (HADO) has encouraged farmers to establish *Leucaena* species that are currently used as fodder. Some other trees such as *Senna siamea* and *Azadirachta indica* were introduced mainly for soil conservation purposes, for wood and for shade. Similarly, the Livestock Production Research Institute (LPRI- Mpwapwa) in collaboration with the Swedish Agency for Research and Cooperation with Developing Countries (SAREC) and HADO, has enhanced planting of fodder trees in Kondoa District, Dodoma Region where zero grazing technology has been introduced. On top of this, LPRI is doing agronomic and nutritive value studies of some of the local and potential browses that have been identified (Table 5).

Table 5: Mean values of agronomic characteristics of local trees and shrubs evaluated at LPRI Mpwapwa

Tree/shrub	Leafiness (0-10)	Leafdrop (0-10)	Greenness (0-10)	Plotcover (0-10)	Vigour (0-10)
<i>Albizia harveyii</i>	7.37	2.87	7.37	9.12	7.50
<i>Crotalaria spp.</i>	7.75	2.00	7.00	7.00	7.50
<i>Combretum guanzee</i>	8.12	1.87	7.62	9.87	8.37
<i>Delonix elata</i>	5.75	1.37	6.50	3.75	5.25
<i>Grewia similis</i>	7.37	0.75	6.12	6.75	7.25
<i>Helinus spp.</i>	8.12	1.25	8.00	8.62	8.25
<i>Jasminum spp.</i>	5.25	1.25	5.62	3.00	3.50

Preliminary results on agronomic evaluation of the seven tree/shrub species evaluated at LPRI evaluation plots show that *Combretum guanzee*, *Helinus* species, *Albizia harveyii* and *Crotalaria species* are better in most of the parameters studied including germination, vigour, leafiness and greenness.

Conclusion

The multiple use of the local tree and shrub species in different farming systems has led to negative and positive effects. The negative one is related to wiping out, for example, of the species that are more palatable to grazing and browsing ungulates as well as those with very good wood for fuel and tool making. As a result many areas are bare and are susceptible to wind and water erosion. The positive effect involves exploiting of this knowledge from users (farmers) and incorporating it in research and development systems for the benefit of the present and future generations. It is therefore important for all parties (research-extension-farmers) to work collectively for the purpose of building a sustainable livestock production system through efficient utilization of multipurpose trees and shrubs.

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