

Conservation And Cultural Aspect Of Mkilua Fragrans Verdc. At The Kenyan Coastal Lowlands

Najya Muhammed, Mohamed Pakia, Moses Wainaina

Abstract: Mkilua fragrans Verdc belongs to the Annonaceae family and is part of the biological diversity of the coastal forests of east African coast region. The Swahili and Digo communities of the Kenyan coastal lowlands have engaged in traditional perfumery using various plants and Mkilua fragrans being one of the major sources. Drawing from the semi-structured interviews using questionnaires, open-ended focused group discussion that involved 30 Mkilua growers and entrepreneurs of Mkilua products, residing in Kwale, Mombasa, Kilifi and Lamu counties of Kenya respectively. It was established that Mkilua enjoys a considerable ex situ conservation and the Mkilua flower is known for its aphrodisiac power to keep men (husbands) indoors after sun-set. There are also beliefs related to Mkilua, of 'fish water' washings ("maji ya samaki") for fertilizing the Mkilua plants, which enhances the plant vigor, flower quality and its scent which was scientifically proven to show that indigenous knowledge have scientific basis; where culture meets science .

Key words: Mkilua fragrans Verdc, East African coastal culture, Annonaceae, perfumery, indigenous knowledge, Digo, Swahili

INTRODUCTION

Mkilua fragrans is a terrestrial shrub or small tree (Beentje 1996) that grows to about 5 m in height. The species in situ distribution is restricted to the Kenya coastal forests and the Tanzanian East African Arc Mountains (Lovett, J. 1998). The species has a fairly restricted range of distribution to the extent of its occurrence being considered vulnerable (Oldfield et al. 1998; IUCN 2012). Its population is reasonable where it occurs and was recorded in several forest reserves (Witu, Mrima, Kwangumi, Rondo), in sacred kaya forests (Muhaka, Kinondo, Chale) and in other protected forest areas (Shimba Hills National Reserve and Mafia Marine Park) (Ref. Eastern Arc 2009). The species faces a number of threats in its natural habitats of coastal forests, including expanding agriculture, tourism, and mining, among others (Tabor, 2009). Mkilua fragrans is in a single member genus that was named after its local (Swahili) name – Mkilua, and the epithetic name is indicative of its fragrant flower. A member of the Annonaceae, of Magnoliales in Magnoliopsida, the species was investigated for fatty acids and essential oils (Baraza et al 2006) where a mixture of constituents was isolated from the fruit and the stem. One of which, Mkiluaynoic acid A, exhibited antifungal activity against *Candida albicans* comparable with that of the standard antifungal agent Ketoconazole (Baraza et al 2006). Notably though its traditional perfumery usage and potential upscaling of the commercial engagement has not been investigated. Mkilua fragrans Verdc essential oils have been used for centuries by the coastal communities of Kenya to provide perfume used during social gatherings such as weddings. However, there is a general under exploitation of the various plant sources of essential oils for perfume industry (Folashade and Omoregie, 2012), Mkilua fragrans being one such underexploited species in a rich biodiversity along the Kenyan coast.

MATERIALS AND METHODS

A random Survey was conducted using semi-structured interviews among growers and entrepreneurs of Mkilua products, to capture on current socio-cultural and economic practices in the coast of Kenya. This was combined with focused group open-ended discussion and experts meeting, all deliberating and sometimes attempting to confirm some of the data collected from individual respondents. Visits were made to Mkilua growers in five Districts, namely: Lamu, Malindi, Kilifi, Mombasa, Likoni and Msambweni. Open ended discussions questionnaires (80% female respondents and 20% male respondents) were used, using thematic questions in a semi-structured questionnaire. The respondents were diversified in education standards, some with Primary education only, others with Secondary education and others with Madrasa (Islamic schooling) only. 70% respondents were over 50 years old and 30% were 30 years old or less. Stemming from a belief captured in the interviews, an analysis of the 'fish' water washings (maji ya samaki) for nitrogenous compounds like NO_3 , NH_3 , and NH_4 was carried out, to determine the fertility claim. Samples of fish water washings were collected from a local fish shop in Mombasa in sealed plastic bottles and stored at 4°C. The fish waters were then analysed for nitrates and nitrites after passing through the reduction column and also analysed for ammonia (Parsons et al. 1984) at KMFRI laboratories in Mombasa. The detailed experimental procedures are contained in the supplementary materials (Parson et al., 1984).

RESULTS AND DISCUSSIONS

Mkilua fragrans was identified variably between the two ethnic groups involved. The Swahili identified it with synonyms Mkilua, Mlua and Muua. The Digo identified it with synonyms Mlua, Mchilua, Mrua and Chingade. Apart from the Digo name Chingade, all the other names maintained the prefix M, to denote the recognized growth habit of Mkilua as being a tree (Mti and Muhi) respectively (Pakia 2006) and the suffix _ua (flower). This most likely underscores that Mkilua is identified and valued from a utilitarian perspective by the two communities, especially on the scent from the flower. Other plant parts were labeled variously, and the details are in table 1.

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Plant Part	Swahili name	Digo Name	Name analysis (Based on: Pakia, 2006)
Stem	Mjiti	Chigongo	Swahili label is a diminutive term for the name 'tree' i.e. Mti; Digo name carries a prefix that denotes a diminutive term, i.e., Chi_.
Leaf	Jani	Kodza	Both terms share the respective common label for leaf organ
Flower	Ua	Ruwa	Both terms shares the respective common name for flower organ
Fruit	Mbegu	Maragwe	Swahili label identifies the fruit as the source of next generation (germplasm), i.e. label is based on functionality of the part. In contrast, the Digo label which is synonym with beans, means the label is in reference to the fruit type - 'pod', i.e., based on structure.
Seed	Mbegu	Tembe	Swahili again label seeds from the functional role (source of next generation), while the Digo label the seeds from the structural perspective
Roots	Mizizi	Mizi	The roots almost share a name in the two ethnic groups, which represent the respective label of the common name for root organ.

Table 1: Swahili and Digo vernacular names of the plant parts of *Mkilua fragrans*

Notably, the label of parts was indicative of size, function and structure. The stem, for most of the plants that were used as reference for discussion were less than 2 m in height, too small to compare with stems of other gigantic trees. In both communities, thus a diminutive label for 'tree' was noted. Interestingly, the fruit and seeds were identified on basis of their role by the Swahili – mbegu (germplasm), the source of the next plant generation. In contrast, the Digo based their labels on structural feature, i.e., maragwe (beans) for the fruit, in reference to the 'pods'; and the seed as 'tembe' (grain) which is a reference to small particles or granules, inclusive of lifeless soil particle - tembe ya mtsanga (sand/soil grain).

Mkilua Domestication Patterns

Majority (80%) of the respondents had only 3 or less *Mkilua* trees, and between 10 to 20 trees. Those noted to have many trees were found in urban areas of Malindi with a

single grower and two growers in Mombasa, which was contrary to expectation based on land availability. The possible explanation to the urban concentration is market availability from urban dwellers. Some of the trees recorded in Malindi were said to be over 50 years old, and still in their productive age. Noted in this study, was that the growers with many trees (40% and above) change from the tradition of growing trees in the open to the trees being grown in enclosed wall or fence – for protection, the growers explained. The protection is an indication of value attachment i.e., substantial economic gains from the products. This observation is evidence that increased market value of the *Mkilua* products can be a motivating factor to increased domestication, protection and better management of the species. From the study, most respondents expressed wish to increase their plant numbers, but had challenges that needed to be addressed.

Mkilua Products

85% of *Mkilua* growers indicated domestic use as the main reason for growing and managing the *Mkilua* trees. 10% of respondents practiced both domestic and commercial uses from their trees, and 5% had commercial use as the main objective of the tree growing, and these were the owners of 10 trees and above. However, one grower in Mombasa refused to disclose commercial engagement, probably in fear of potential 'tax-man' consequences. Indications here are that for most growers' the commercial aspects of *Mkilua* are not as emphasized as the social aspect – where flowers are shared among friends, relatives and neighbors. In all cases, the *Mkilua* was grown together with other flower valued plants, such as *Ylanglang*, basil, *Jasmin*, *Rose*, and *Nargis*. The combinations though differed between growers, and the rarest recorded plant among the growers was *Nargis* recorded only in two homes. The main plant part from *Mkilua* that was most valued and used was the flower. The flowers were used as a 'perfume' in bed-rooms, where women spread fresh, raw flowers on bed just before night fall. This activity was believed (by some) to have an aphrodisiac power and keep men (husbands) indoors after sun-set. The growers shared the *Mkilua* (flowers) with friends, relatives and neighbours for free or at a very small fee that does not meet the threshold of commercial recognition, i.e., not contributing significantly to the household income. There were no permanent markets for most growers, except for those in Mombasa and Malindi urban areas where creative and artistic professionals make Swahili version of flower adornments known as *Kikuba*, *Kishada*, *Koja* and *Joho*. These are made from a collection of flowers including *Mkilua*, *Ylanglang*, *Jasmin*, *Rose*, and *Nargis*. A *koja* is an adornment of flowers worn around the neck" especially by brides during wedding ceremonies; and by special guests and dignitaries in celebrations and political functions. These intensely sweet, warm floral products provide potent aromas that are known to have antidepressant characteristics. These flower decorations are worn by brides plate 2a or dignitaries during eventful occasions and ceremonies as shown in the photos Plate 2b.



Plate 2a: Kikuba/kishada (in its box package and while dressed on the heart by a bride or ladies and money attached as present)



Plate 2b: "koja" a flower necklace adornment dressed by bride grooms or dignitaries during festive sessions

Since these flowers are mostly seen elaborately during weddings, the adornment gives an impression of the economic status of the groom and acceptability of the bride by the groom's family. Thus a famous traditional local Swahili song, common during the weddings has verses that capture kikuba as an important adornment. The song goes by the words: Kikuba cha asimini hakikuja bure weee, waliyataka wenyewe mali ya totore. (The adornment of kikuba did not come for free, they agreed to it when they paid the dowry fee). In addition to the flower products from Mkilua, some respondents identified the tree as a

multipurpose tree, with additional uses being: firewood from the stems, the flower scent used as mosquito repellent (Odallo et al 2005). Dry flowers are also used to make 'scrub' for cleaning skin, also believed to have antibacterial function. Additionally Mkilua flowers are also used to scent coconut oil perceived to have an irritating smell but commonly used as traditional hair oil; the Mkilua scent is intended to give it a better aroma. This is achieved by soaking the fresh flowers in freshly prepared coconut oil and left for a period of about seven days or more, where the coconut oil treated in this manner is devoid of the unpleasant odour like the one that emanates from untreated coconut oil. Hence a low oil perfume extraction has been applied using this traditional method of extraction by some Swahili women in Lamu, Malindi and Mombasa. The users of Mkilua were said to be mainly women, and few men only use them by placing them under their Islamic hats (kofia) as shown in Plate 3 or inside their front shirt or kanzu (Islamic white robe) pockets



Plate 3: A man dressed in Islamic attire (kanzu) with hat (kofia) with Mkilua flowers either in the front pocket of the kanzu or underneath the kofia

However, despite the identification of stable market outlets in urban areas, the annual income values were not stated precisely by respondents, either by flat refusal to disclosure or explained as undefined/unstable economic income. It was also observed that in the urban areas, the owners generally tend to better safe-guard their trees, as well as employing casual labor to tend on the trees. These observations are evidence that a market for Mkilua products and other flower plants exists, except it's exploited by very few growers. There were conflicting opinions on the favorable production season for Mkilua. Some farmers indicated the rain season as the most productive time; and others indicated the dry season as the most reproductive season. However, all the growers noted that they must water their trees during the dry season else they lose them due to water stress. The growers reported several challenges for the Mkilua tree. Most of them reported theft of flowers by neighbors and destruction of trees by livestock animals. The tree was also prone to diseases and pests especially white ants and aphids. The dry conditions which are increasing in severity were also reported to affect the growth and productivity of the Mkilua. There were no mitigation actions for most of the above challenges, except one grower who used insecticide to spray against the pests. Several myths were mentioned relating to Mkilua plant by

majority of respondents. It was argued that watering of Mkilua tree(s) with water that had been used to wash fresh fish ('fish-water washings' maji ya samaki) enhanced the plant vigor, flower quality and its scent; that evil spirits (mashetani) that love the flower scent stay within the area where Mkilua is grown; and that tree is destined to death when goats feed on the Mkilua leaves and branches. The 'fish-water washings' were analyzed for nitrogenous compounds to determine whether they actually affect the growth of the tree.

Mkilua knowledge and practices sustainability

It was noted that most of the growers got their knowledge from their family members, i.e., more of a family tradition, and some grew the trees because of love for tree and/frequent participation in wedding ceremonies where Mkilua flowers were used. Surprisingly, a considerable number of the growers (30%) were not engaging in transmitting their knowledge to the next generation. The reasons given for this failure were that: the youth are occupied in the new education system, almost with no time for traditional knowledge; modernity among youths is also eroding traditional knowledge, values and practices; lack of stable and reliable market for the Mkilua products to encourage commercial engagements; and the availability of contemporary perfumes which pose inequitable competition to Mkilua perfume. Despite this observation, from the local perspectives, the loss of the Mkilua tree is likely to trigger loss of some East African coastal culture, especially related to weddings and bed-room matters. The loss will also include disappearance of lexicon content such as the words related to these cultural practices. The survival and continuity of all these cultural aspects therefore depend on the continued existence of Mkilua tree and the related knowledge.

Ecological Survey

The ecological considerations on Mkilua fragrans plant was done in Kaya Muhaka. The small tree grew in clusters of between 3 and 8 mature/reproductive individuals, with a considerable concentration of seedlings and saplings at the ground cover. The trees were growing on a sandy loam soil, with a rich litter fall and humus content. The forest area where the Mkilua trees were found was a relatively open area, qualified to be described as secondary vegetation, allowing over 60% sunlight penetration. This is indicative that Mkilua is not a shade specialist plant. The Mkilua population pockets concentration were located commonly at or near the forest edge, while their mid-forest localities were areas that potentially had been high-closed forest sections affected somehow to result in forest gaps. The phytosociology of Mkilua seemed not restricted as the neighbor species did not show any patterns of consistency, but notably some of the neighbor species were the secondary forest species, that included graminoids. None of the Mkilua trees observed grew in a single major straight pole (dominant primary stem), instead the trees had high branching proliferation right from near the stem base. This suggests that the tree lacks apical meristematic dominance. During the time of visit, a period preceded by a dry condition spell and with the short rains (with the el nino phenomenon) just setting in, the trees were generally flowerless. Some were fruiting, carrying green pods from

the previous flowering period. Despite the preceding harsh dry conditions, the Mkilua trees were vividly very healthy with no indications of water stress. Their leaves were maintained as sparkling shiny green that ranged from light green in young leaves to dark green in mature leaves.

The 'fish' water and fertility concept

The analysis of the 'fish-water' showed a high concentration of nitrites/nitrates (142.17 µg N/L) and moderate concentration of ammonia (5.611 µg N/L). This presents the possibility of the feeding enhancement of the plant hence improved growth and consequently an increase in the Mkilua flower scent. This analysis proves that some aspects of the indigenous knowledge have scientific basis, and can be used as starting points where culture meets science. Further analysis (for essential oils) and investigation of the socio-cultural beliefs and practices, as well as the value addition of economic potential of Mkilua are ongoing in this study.

Conclusion

The majority of Mkilua growers are elderly, and the growers do not make any significant gains from the trees which are used mostly in a communal and friendly perspective. There were limited financial gains to most growers. However, opportunities for the Mkilua growing to turn commercial do exist, with potential to contribute to household economic inputs considerably. The challenge is identifying the markets and markets creation through value addition – e.g. increasing diversity of products and targeting a wider market group. The Research project has a chance here to ensure an indigenous knowledge and practice is maintained in the lives of the coastal communities, through value chain addition which will encourage growers and users, while at the same time economically empowering the women folk.

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REFERENCES

- [1]. Baraza LD, Nkunya MH, Jonker SA, Juma SR, Waibel R.; C18 tetraynoic fatty acids and essential oil composition of Mkilua fragrans. *Nat Prod Res.* (2006); 20(2):187-93.
- [2]. Beentje, H. 1994. Kenya trees, shrubs and lianas. Nairobi: National Museums of Kenya.
- [3]. Eastern Arc Mountains & Coastal Forests CEPF Plant Assessment Project 2009. Mkilua fragrans. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>.
- [4]. Folashade K. O. and Omoregie E. H.; (2012) Essential oil of *Lippia multiflora* Moldenke: A review. *Journal of Applied Pharmaceutical Science* 02 (01); 15-23

- [5]. IUCN (2012) - IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org> accessed on 10/03/2013
- [6]. Lovett, J. C. (1998) Importance of The Eastern Arc Mountains For Vascular Plants. *Journal of East African Natural History* 87: 59-74 (1998)
- [7]. Oldfield, S.F., Lusty, C. and MacKinven, A. (1998) *The World List of Threatened Trees*. World Conservation Press, Cambridge, UK
- [8]. Odalo O. J., Omolo M. O., Malebo H., Angira J., Njeru P. M., Ndiege I. O., Hassanali A. (2005) Repellency of essential oils of some plants from the Kenyan coast against *Anopheles gambiae*; *Acta Tropica*; 95(3):210-8.
- [9]. Pakia, M. (2006) *African traditional Plant knowledge today: An ethnobotanical study of the Digo at the Kenya Coast*. LIT, Berlin.
- [10]. Parson, Timothy, Lalli C.M., Maiti, Y. (1984). *A Manual of Chemical and Biological Methods for seawater Analysis*. Pergamon Press, Oxford.
- [11]. Tabor K., Burgess N. D., Mbilinyi B. P., Kashaigili J. J. and Steininger M. K. (2010) Forest and Woodland Cover and Change in Coastal Tanzania and Kenya, 1990 to 2000 *Journal of East African Natural History* 99(1):19-45. doi: <http://dx.doi.org/10.2982/028.099.0102>