Spring 2015

# Analysis of Traditional Medicine in Zanzibar, Tanzania

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*SIT Study Abroad*

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Resource Conservation and Public Attitude towards the Traditional and Alternative Medicine Policy

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## Acknowledgements

This research was supported by the SIT program. I would personally like to thank my academic director, Helen Peeks, as well as the rest of the SIT staff for their support and guidance along the way. A deep appreciation is held for my advisor, Dr. Simeon Mesaki, whom provided comments and vision that helped with the success of this report. The Zanzibar Department of Forestry has also been helpful during this project. I would particularly like to thank Yussuf Kombo for his knowledge and resources as well as Tahir A. Haji, the head of Jozani Chwaka Bay National Park, for his indispensable help identifying the plants mentioned during this study from their vernacular terminology into scientific names. The Zanzibar Traditional Medicine and Alternative Care Unit in the Ministry of Health has also provided an outlet of resource for the completion of this study. In particular, Haji Juma Haji has provided knowledge important to the success of this study.

I would also like to show my gratitude to the participants of this study for their time and honesty, in particular, the healers for access to the workings of their profession and warmly welcoming my many questions. My appreciation for my two translators, Haji Abeid and Mohammed Salaamah, throughout this study is never ending. Haji provided company during long days at Mangapwani that made interviews go both smoother and faster. A very special thanks to Mohammed for not only being my translator, but also being my teacher and friend well beyond the duration of my study. Last, but certainly not least, I would like to thank my fellow SIT students for their wonderful input and support during not just the ISP period but during our time spent in Zanzibar.

## Abstract

Traditional medicine is used as a major source of health care in developing countries. A small island off the coast of Tanzania, Zanzibar has traditional medicine embedded in its culture. Informal interviews of community members and healers in four different villages as well as interviews with the Department of Forestry and the Traditional and Alternative Medicine Unit were conducted over a four week study. This study found that community members of four villages in Zanzibar supported the idea of a regulation of traditional medicine by the government. It also found that the majority of traditional medicine users have noticed a decrease in medicinal plants. The support of traditional medicine reaffirms the importance of improvement of traditional medicine through the implementation of the regulation under the Traditional and Alternative Medicine Policy of 2008. Natural resource conservation is one of the ways in which the regulation could best protect the community use of traditional medicine in Zanzibar.

## Introduction

Traditional medicine is a major source of health care globally. As of 1997, over 3.5 billion people in developing countries relied on traditional medicine as their major source of health care (Balick and Cox, 1997). Traditional medicine is described by the WHO (2000) as including the experiences and knowledge of natives through their culture to treat overall physical and mental health. Traditional medicine has provided sound treatments against many diseases and has been used as the active ingredients in over 120 pharmaceutical drugs (Shirayama, Phompida, & Kuroiwa, 2006; Odugmeni, 2008; Hoareau and DaSilva, 1999). The value of traditional medicine lies in its ability to address not only the physical ailment of a person but also to do so in a way that includes cultural and spiritual beliefs (Campbell and Amin, 2014).

Zanzibar Island, located off the coast of mainland Tanzania, has a thriving culture of traditional medicine (Ministry of Health Zanzibar, 2008). Traditional medicine has a slightly turbulent history in Zanzibar. The socialist policies adopted after the Zanzibar Revolution in 1964 brought with it the governmental endorsement of western medicine and a subsequent shift away from traditional medicine. Following economic issues arising from providing free western medicine in the 1970s, traditional medicine once again was allowed to became a major component of

healthcare in Zanzibar in the late 1980s and early 1990s (Meier zu Biesen, Dilger and Nienstedt, 2012; Parkin, 2006). As of now, over 99% of the population uses traditional medicine either directly or indirectly. This means that care must be taken to maintain the effectiveness, presence and validity of healers and medicinal plants is of upmost importance (Yussuf Kombo, Personal Communication, April 23, 2015). The Zanzibar Ministry of Health (MoH) took the first steps towards mainstreaming and regulating traditional medicine with the promulgation of the Zanzibar Traditional Medicine and Alternative Health Policy in 2008 as well as the establishment of a Traditional Medicine and Alternative Care Unit as part of the MoH in 2009 (Meier zu Biesen, Dilger and Nienstedt, 2012).

The policy is comprehensive and revolves around the major goal of regulating "Traditional and Alternative Medicine (TAM) practice while protecting indigenous knowledge, intellectual property, consumer and other rights as well as medicinal resources" (Ministry of Health and Social Welfare, 2008). There are eleven sub-goals that if adhered to would contribute to the overall efficacy of traditional medicine: legislation & regulation, registration, administration, human resource capacity building, promotion of research, promotion of rational use of TAM, local production, protection of intellectual property rights, processing & marketing, international and inter-sectoral collaboration and monitoring & evaluation (Ministry of Health and Social Welfare, 2008). The unit has already made monumental progress in the registration of healers, kilinge and TAM clinics. Kilinge are the offices where healers meet patients, though they are smaller than clinics. As reported by the registrar of the Traditional Medicine and Alternative Care Unit, approximately 205 healers, 158 kilinges and 40 medicinal plants have been registered up to now. In 2010, the unit made further progress with the establishment of a government regulation for traditional medicine (Personal Communication, Haji Juma Haji; April

18, 2015). In addition, the formation of traditional medicine as recognized healthcare has been further advanced by training workshops in 2011 funded by World Doctors. It was held by the Traditional and Alternative Medicine Unit to educate healers on the Zanzibar Traditional and Alternative Medicine Policy and the expectations of registration (Meier zu Biesen, Dilger & Nienstedt, 2012).

While the unit has made advancements in registration and has made a multitude of attempts to integrate traditional medicine into hospitals, it is limited in its actions due to a lack of resources and staff. Currently, the unit has 5-6 employees in the Stone Town office on Unguja and no staff members placed on Pemba. The sector also has no means of transportation (Personal Communication, Haji Juma Haji; April 18, 2015). The unit's sole focus on registration has been at the sacrifice of other important goals, including the development of conservation efforts. Natural resources are often used to fulfill all community needs and so a loss of critical resources would cause in imbalance in daily life (Pimentel et al., 1997). As traditional medicine revolves around the usage of plants, its success ultimately depends on the availability of those medicinal plants. Conservation of these natural resources is one of the responsibilities of the Department of Forestry in Zanzibar. As such, they are directly involved in the protection of traditional medicine through the preservation of medicinal plants (Personal Communication, Yussuf Kombo; April 23, 2015). Currently there are twenty nurseries maintained by Forestry, twelve on Unguja and eight on Pemba. These concentrate on cultivating plants considered in danger.

The aim of this study is to analyze important aspects of traditional medicine and the implementation of the Zanzibar Traditional Medicine and Alternative Health Policy, with focus on resource conservation and public attitude towards regulations in both rural and urban villages of Unguja Island, Zanzibar. As one of the many goals of this policy is also to create a localized

pharmacopeia of medicinally used plants in Zanzibar, this study, in part, attempts initial steps towards accomplishing that goal.

## Study Area

The whole of this study was conducted on the Unguja Island of the Zanzibar archipelago. Zanzibar is located off the coast of Tanzania mainland in East Africa on the Western Indian Ocean. The archipelago consists of the islands of Unguja and Pemba which form the isles of the United Republic of Tanzania. As of the last Population and Housing Census conducted in 2012, the population of Zanzibar is approximately is 1,303,569, of whom 896,721 inhabit Unguja and 406,848 inhabitants on Pemba (NBS, 2014). Zanzibar vegetation is categorized under the Zanzibar-Inhambane regional center of endemism (UNEP, 2001). This center ranges from Somalia to the Mozambique coast. It was defined through measurements of endemic vascular flora (Clarke, 1998). Zanzibar is classified as a biodiversity hotspot, which over 1,400 species endemic to the region (Meyers, Mittermeier, Mittermeier, da Fonseca & Kent, 2000).

Four villages on Unguja Island were chosen as the focus for this study: Stone Town, Bububu, Pete and Mangapwani.

### Stone Town

Stone Town, also known as Zanzibar Town, was chosen due to its urban setting. The presence of both traditional medicine and western hospitals also eliminated proximity of either health care option as an extraneous factor.

### Bububu

Bububu is another urban suburb located approximately twenty minutes away from Stone Town. It is also known to readily have access to both western and traditional medicine.

**Pete**

Pete was chosen due to its proximity to Jozani Chwaka Bay National Park, which has a high species index (Nahonyo et al., 2002). There is a high use of herbal and traditional medicine in the areas surrounding Jozani (Yussuf Kombo, Personal Communication, April 16, 2015) and it is a rural area.

**Mangapwani**

Mangapwani is a village located on the northwest coast of Unguja. It was chosen due to it being both a rural village and one that is known for traditional medicine.


Figure 1- View of Unjuga Island, Zanzibar. The four locations, StoneTown, Bububu, Pete and Mangapwani, are indicated with stars on the map. Pete is the only star that does not also have the name corresponding placed on the map, however it is the closest to Jozani Forest. Image retrieved from http://www.zanzibarpackage.com/.

## Methodology

This study was conducted over the course of 28 days from April 6th to May 2nd of 2015. Informal interviews were held with both Zanzibar locals and healers. Local participants were randomly selected during visits to each area and no compensation was given. Healers were found through previous contacts or through the help of the locals. No compensation was provided during those times either. The interviews

were held in Kiswahili unless the interviewee had a sufficient understanding of English and a translator was present during all of the interviews with locals and healers. Interviews were conducted in two urban areas, Stone Town and Bububu, and two rural areas, Pete and Mangapwani. Vernacular names of plants given throughout the study were converted into scientific names with the help of Tahir, head of Jozani Chwake Bay National Forest as well as the article written by Legère (2003). All questionnaires can be found in Appendix A. For a list of Kiswahili words that would be useful to know for this study, also see the appendix (Appendix B).

Information was also gathered from interviews held with various government officials from the Department of Forestry and Department of Health, specifically the Zanzibar Traditional Medicine and Alternative Care Unit. This information helped to provide context and supporting material for healer and local interviews.

Qualitative data was analyzed as follows and any figures or graphs were created using Microsoft Excel.

**Pharmacopeia**

The names of commonly used plants were collected through interviews with both locals and healers of all four villages. The top three were then further expanded on and a literature search was done to discover their physical, chemical, ethno medical (medicinal uses), pharmacological and toxicological properties. Also included are uses reported by locals during this study and the distribution of the plant.

### Public opinion

Responses were analyzed while placed the two following categories, locals and healers. Attitude towards regulation as well as opinions, problems and uses of traditional medicine were analyzed.

*Note that in order to protect the identity of the healers in this study, an analysis of registration status based on location was not completed.

### Resource Conservation

Names of lost or less easily accessible plants mentioned during interviews were cross checked with the list of plants currently grown by the Department of Forestry in their nurseries. Further analysis was done based on participant responses.

## Results

### Pharmacopeia

The plants reported as the most commonly used, in order of most mentioned, were *Azadirachta indica, Solanum incanum, Ocimum suave* and *Ocimum canum.* The following three plants were next commonly mentioned in equal amounts; *Lippia asperifolia, Citrus aurantifolia* and *Suregads zanzibariensis*. *Azadirachta indica, Solanum incanum* and *Ocimum canum* were mentioned most often by locals of Mangapwani while *Citrus aurantifolia* and *Lippia asperifolia* were most commonly mentioned in Pete. *Ocimum canum* was the only most commonly mentioned plant that was not also reported by healers as commonly used (Figure 2). A detailed analysis of the three most common plants and their uses is found at the end of the appendix in the form of a pharmacopeia (Appendix D).

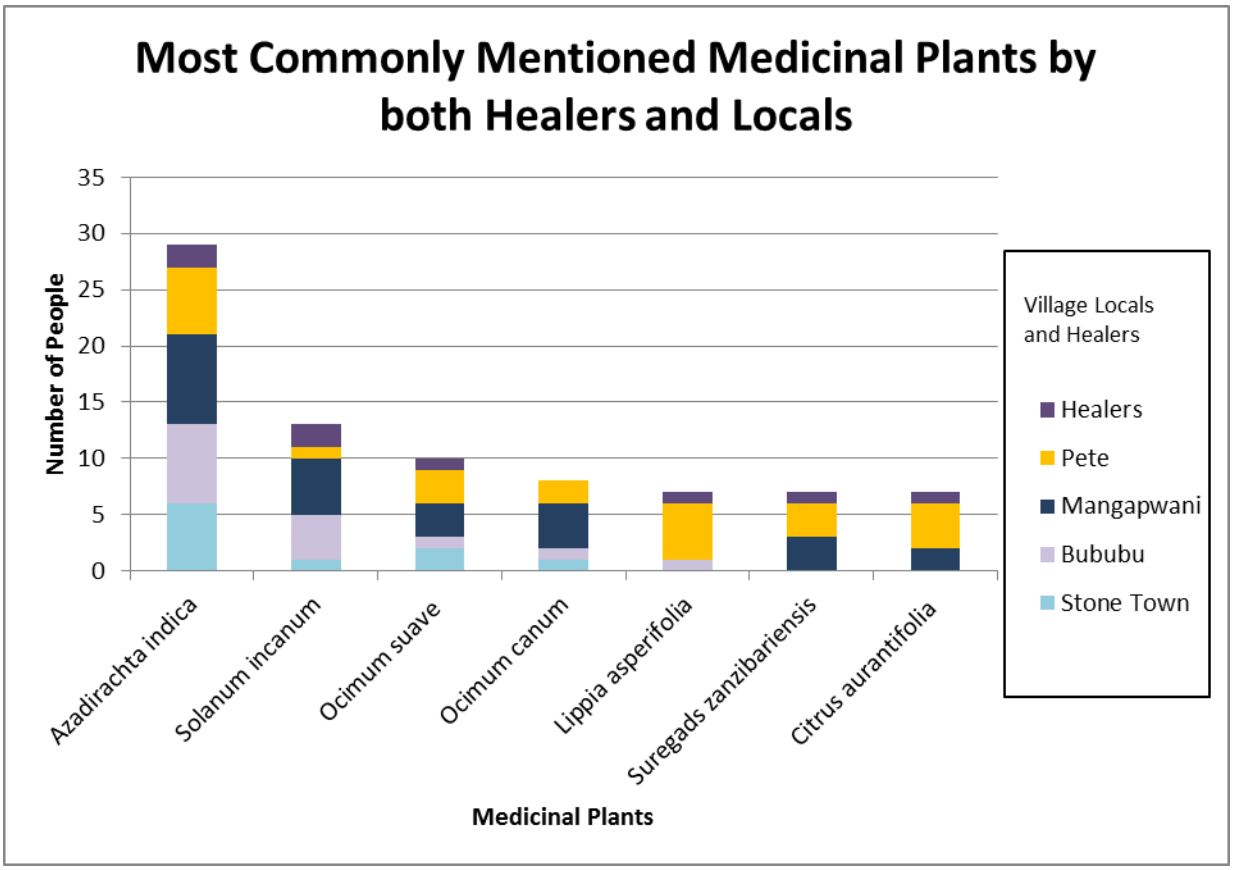


Figure 2. List of the most commonly mentioned medicinal plants by location and whether mentioned by villager (Pete n=12, Mangapwani n=13, Bububu n=11 & Stone Town n=12) or healer (n=7).

## Public Attitude

### *Locals*

Amongst the 48 locals from varying villages who participated in this study, 79% reported use of traditional medicine. Of that percentage only 18% reported traditional medicine as their first source of healthcare, including both self-treatment and also visiting local healers; 16% reported traditional medicine as their first choice depending on the severity illness. Out of every participant in the study, only one person from Bububu was unable to list any medicinal plants

used, despite having previous use of traditional medicine, while going to the hospital first. Despite lack of traditional medicine use, all other respondents were able to report at least one plant used for medicine purposes, including those who reported no use of traditional medicine.

Those who acknowledge use of traditional medicine where further questioned on the method by which they received local medicine. This yielded a trend of common locations: collection of plants from forests, going to a healer, purchasing from a store or collecting from a garden. The most common source was from the forest or, as one man from Pete referred to it, "mother nature." Out of the thirty seven respondents who used traditional medicine, thirty four mentioned the forest was where plants were collected. Participants from the rural areas of Pete and Mangapwani were more likely than those from the urban areas of Stone Town and Bububu to report collection from forests, as every user (100%) of traditional medicine in rural areas (n=21) reported collection from forest while 81% of urban participants collected from forest (n=16). Furthermore, of that 81%, 6 people specified that they went to the shamba for the collection while only 2 said they could find them growing in town. No such specification was reported by rural respondents. Going to a healer was also mentioned by people of both rural and urban villages, 7 and 6 people respectively. The presence of a garden, either self-grown or one of a nearby community member, was also listed by four people as a source of medicinal plants. All four of these people were from Stone Town. Medicine bought either in mixed or packaged form as well as loose plants was also reportedly used by two locals in urban areas, specifically Stone Town. One local from Mangapwani mentioned that they also imported plants from Tanzania mainland.

When questioned on problems associated with traditional medicine and its use, 17 people said yes, 27 reported no problems while 4 did not answer. When questioned further on what the

problems were, some of the mentioned included ineffectiveness, misdiagnosis by healers, loss of knowledge, fake healers, dosage issues, side effects and a bitter taste.

Every local, regardless of their traditional medicine use, was asked their opinion on whether traditional medicine should be regulated. A majority of respondents agreed that a regulation would be a good idea and would improve traditional medicine in Zanzibar; 33 out of 48 responded positively. Of the remaining respondents, 8 said a regulation would be a bad idea and 6 were ambivalent about the idea. Only one respondent reported knowledge of the regulation already in existence. Of the people who believed that a regulation would be a benefit to traditional medicine, some mentioned specific things they would prefer as well as overall outcomes expected from such a policy. Some of the specifics desired from the regulation include instructions for proper dosages, conservation of medicinal plants, creation of a "procedure" for environmentally safe methods of picking plants, expiration dates placed on medicines/plants, punishment of false healers and education of healers on appropriate treatments by the government. Overall, people expected that the presence of validated medicines and healers through research and regulations would bring a source of accountability to traditional medicine in Zanzibar. This would in turn also increase the reliability, effectiveness and general use of traditional medicine. For those who were opposed or were indifferent about the idea of a regulation, the most common reason was a lack of faith that it would be effective or able to be implemented properly. Some mentioned the vast number of plants and their uses in rural areas were too great to be monitored. Others expressed the fear that such a policy would restrict local access to the medicine and plants or that science would not support traditional medicine and natural medicine would be eliminated. One participant simply stated that "a law cannot be placed

on nature" as reasoning behind his opposition to a regulation. Despite some opposition, 69% of locals supported the idea of regulated traditional medicine.

*Healers*

Amongst the healers who participated in this study, the most common source of healer knowledge was reportedly from family inheritance, as the majority reported this as all or part of their source of information. Two healers, both from rural areas, learned strictly from a spirit or shetani while two more, also from rural areas, mentioned the assistance of spirits along with learning from family. Another one of the healers who inherited their skill also reported having supplemental schooling on traditional medicine. The last healer learned his trade through a three year apprenticeship at a medicine shop where he formally worked. Four of the seven healers interviewed were not registered under the Zanzibar Traditional Medicine Policy, while three were.

When questioned if there were problems that existed within their profession, six out of the seven reported yes. Of the problems mentioned, three healers mentioned spiritual issues related to their work. Other problems that were mentioned by healers included issues with the government and funding, competition, lack of effective storage for plants, accusations from unhappy customers and a lack of education in the patients. One healer also mentioned bitterness of the treatment as a problem within traditional medicine.

Healers were also asked where they acquired their medicines. There was no trend noticed based on location of the healer. While many gave multiply answers, all reported some sort of local collection of plants from the surrounding forests or farms. Of those healers, one specified that they purchased the plants from shamba and did not collect themselves. Only one of those that

reported use of plants from forest admitted to buying them instead of collecting them himself at no cost. Four of the healers also imported medicine from Kenya, Dubai or Tanzania mainland. Three of them buy some from stores in town (town was assumed to mean Stone Town, as mjini in Kiswahili most commonly refers to Stone Town) and three grow a portion of the plants they use.

While discussing the status of traditional medicine with healers, approximately half of them reported that it was both beneficial and effective and also believed that it was being used more than western medicine. One healer thought that traditional medicine use has declined recently as more people are using hospital medicine. Two of the healers, both from urban locations and both registered, also noted the lack of education of both other healers and locals on the plants. One stressed the importance of health education to locals while the other focused more on the lack of knowledge amongst some healers and those who sell traditional medicine in urban shops. The progression of "modernized" traditional medicine was also mentioned by two of the healers. This progression was elaborated upon as the development of non-oral methods of receiving herbal medicine (soaps and tablets) as well as the authentication of current medicinal plants in the lab.

**Resource Conservation**

When both healers and locals were asked their opinion on the prevalence of medicinal plants and whether any had decreased in abundance, 60% reported a loss. Out of that percentage, 58% of the affirmatives originated from the urban villages of Stone Town and Bububu. Furthermore, Stone Town had the highest frequency of respondents reporting a loss or decrease of medicinal plants (Figure 3). A total of 42 plants were reported as either lost completely or, most commonly, more difficult to locate (these plants can be found in detail in Appendix C). *Moringa oleifera*

was the most frequently mentioned missing or harder to find plant; it was mentioned four times during interviews when the names of plants were inquired. Out of those 42, only seven were found to be grown in the nurseries by the Department of Forestry: *Zizyphus mauritiana, Milicia excelsa, Syzygium cumini, Zingiber officinale, Bridelia micrantha, Sisyphus mauritiana* and mchofu, of the family Annonaceae . The majority of plants mentioned were not listed as present in the nursery currently in the 2014 and 2015 season.

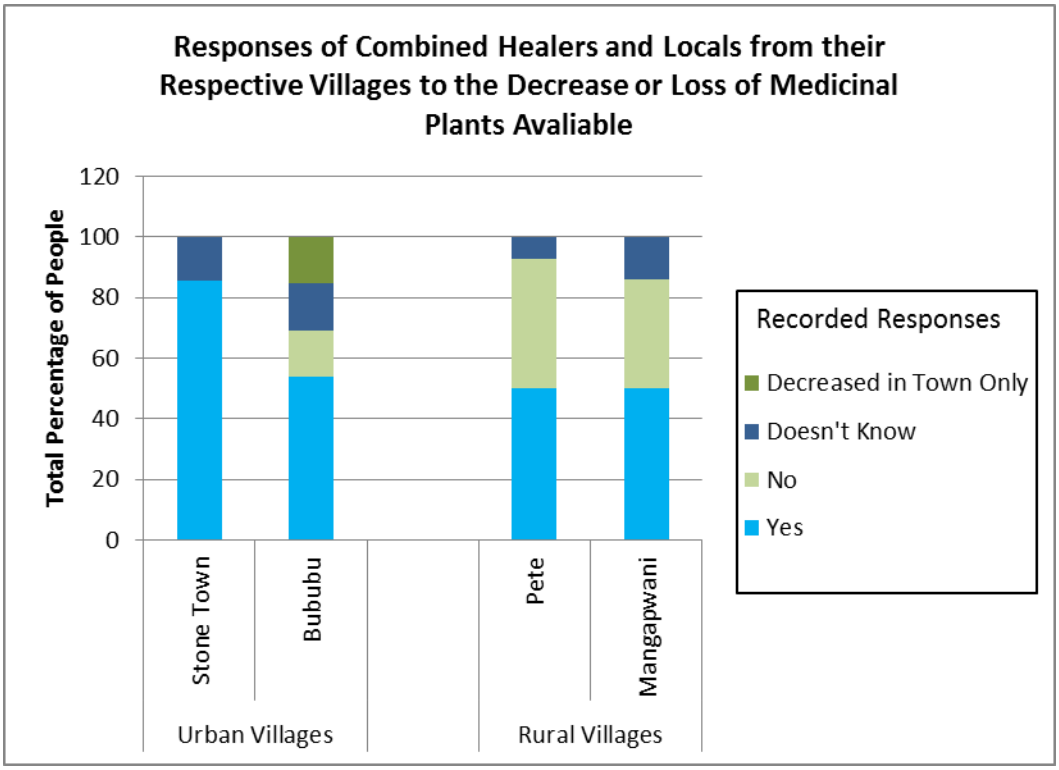


Figure 3. The percentage of people interviewed at each of the four villages included in this study and their responses to whether or not medicinal plants have been lost or lessened. Yes indicates that the participant believes there have been either a loss or decrease in medicinal plants, no indicates there has been no loss and decreased in town only signifies that the participant believes those plants are still available in rural areas.

## Discussion

A lack of awareness of the existing policy on traditional medicine in Zanzibar was evident from this study. Only one respondent reported previous knowledge of such a policy. This lack of awareness could be a result of the relative newness of the policy but could be predominantly due

to the unit's primary focus on registration. Registration contacts and educates only the healers, not the public, which could be a cause of local ignorance. It could also be due to the wording of the question, as their knowledge of the policy was indirectly questioned. A lack of awareness of this policy was also previously discovered in a 2012 study on traditional and western medicine in Zanzibar (Meier zu Biesen, Dilger & Nienstedt, 2012). Unaware of its current existence, people generally supported the idea of a regulation. They felt that it would create a more reliable version of traditional medicine and one person reported that they would switch to traditional medicine if it was regulated, as it would increase confidence in both healers and treatments. Of the problems mentioned by locals with traditional medicine, many of them overlapped with what people listed as the reasons that a regulation would be beneficial. On top of that, the problems healers listed with their profession were also similar to those locals experienced or expected to be prevented by a regulation. Both healers and locals expected a regulation to hold healers accountable for their medical treatments, as dubious healers cast doubt on the effectiveness of traditional medicine (Okatch et al., 2013).

Improper dosage, which could cause side effects or explain ineffectiveness of the medicine, was another of the major problems a regulation could solve. The registration of healers could be continued as it helps with the authentication process of healers and thus begins to hold them accountable for their actions. As another one of the goals in the Zanzibar Traditional and Alternative Medicine Policy, a compilation of plants in Zanzibar would help to educate the public and prevent ignorance concerning the use of plants and possible side effects. A pharmacopeia would provide accurate information on the medicinal plants specific to the communities of Zanzibar that would help them to make more informed decisions concerning their health if copies were distributed amongst Zanzibar (Elujoba, 2012).

Urban and rural villages were equally represented throughout this study in order to eliminate any location biases and also to determine if location in fact influenced the results. No discrepancies between rural and urban participants were noticed throughout the study except when locals were questioned about the source of their medicine. Often those from urban areas mentioned the need to go to farm areas to find the medicinal plants needed. Many times those locals also mentioned the increase of developments as reasoning behind the decrease in wooded areas in and around town, a topic of common research (Hoareau & DaSilva, 1999). Despite an apparent disappearance of readily available medicinal plants in urban areas, it did not seem to affect the use. This is most likely due to the cultural association traditional medicine has in Zanzibar which causes traditional medicine to be more than just a healthcare option, as it is part of the cultural identity (Medeiros Ladio & Albuquerque, 2013).

Overall, this report demonstrates the presence of traditional medicine as a supported health care option for Zanzibar, which is also supported in research done by Donavan (2014) in the area. Due to public support and community demand, having a regulation in place is a necessary step towards improving traditional medicine for the people of Zanzibar. The conservation of medicinal plants as part of the regulation is a crucial goal that deserves more focus. Without improving the conservation effort, the loss of both the physical plant as well as knowledge of treatments is eminent. This was particularly evident during interviews when people were unable to recall the names of missing or lost plants they indicated existed. The presence of medicinal plants seems to be threatened by overuse and the urbanization of the land. Many healers and locals collect their plants from the forest, which presents the problem of overuse. This was exemplified by a community member anecdote; they said plants often disappear from the area when the community suffers from a common illness and forces them to travel further to find the

same plants that were once available close by. Gardens were also mentioned by some in urban areas as a source of medicinal plants. Gardens would help conservation efforts if utilized more often and in larger scale, as was previously done in Kilimani and Victoria Gardens. A healer explained that the botanical gardens used to be sponsored by the government; however they have not been maintained. Under the traditional medicine policy, these botanical gardens are one of the suggested methods of improving and maintaining the conservation of the medicinal plants. As only three of the missing plants mentioned by healers or locals in this study are currently grown in the Department of Forestry's nurseries, attention to preserving some of the plants mentioned in this study is necessary.

Despite actively avoiding the term "western medicine" during interviews, it was mentioned many times by the respondents. Many used western medicine to either draw comparisons between traditional medicines or as a reference for what regulation health care could be, similarly to the way correspondents replied in a previous study done in Botswana about the opinions on the efficiency of traditional medicine (Okatch et al., 2013). The dangers of harsh chemicals in those biomedical drugs were often toted as the impetus for traditional medicine use, as it is considered much safer on the body. Much previous research has also confirmed the idea of traditional medicine as the softer and chemical free alternative to western medicines (Okatch et al, 2013). Interestingly, people indicated the modernization of the way plants are being used in traditional medicine. Some of these changes include the use of plants in tablet form, as soaps and as mixes or oils as opposed to traditional methods of boiling the whole plant and drinking or steaming. As traditional medicine begins to change and resemble westernized methods of ingestion, the importance of an effective regulation is stressed.

Throughout this study, an occurrence of common fallacy was observed. A common fallacy is a classification of thinking that often excludes logical reasoning (Weber and Brizee,2013). A representativeness heuristic occurs when opinions and viewpoints of a population or group of individuals is based solely on past experiences and may ignore certain pieces of information. When questioned, many people elaborated on personal or community stories where either western medicine or traditional medicine was ineffective or harmful. These stories seemed to dictate if people used traditional medicine, their opinion on western medicine and even their reasoning behind their opinion on a regulation. This may be a limitation, as isolated stories may not be representative of the reality (Dancey & Sheagley, 2013). On the other hand, the personal experiences shared provided an in-depth view into the health care services of Zanzibar and should not be discounted. Some studies even support the use of heuristic decision making as an efficient method of rationalizing ideas, as they are shaped by the surrounding environment and culture climate (Gigerenzer & Gaissmaier, 2011).

Other limitations that arose from this study included a lack of appropriate sample size, which was mainly due to a lack of time and resources to include more participants. The language difference may have also caused issues, as certain ideas or expressions in Kiswahili can be difficult to translate accurately into English; however, due to the extensive knowledge of both languages by the translators, this limitation should not have caused any major issues during data collection and analysis. One major limitation of this study, however, was the variety of plant names that exist for one plant. As many participants were unable to provide a sample of the specimen, only the Kiswahili names were given. These vernacular names tended to change depending on the location, as was evident during the attempts to identify their scientific counterparts (Legère, 2003). This inconsistency in common Kiswahili plant names was

highlighted when one of the participants indicated he originated from Tanzania Mainland. For example, the species *Ocimum canum* is referred to as mtule in most regions of Zanzibar while the respondent from Tanzania referred to the same plant as mhasha. The help from those well versed in botany on the island of Zanzibar should have helped to eliminate any possible misidentifications. However, a visual identification of the plants would have been more reliable.

## Conclusions and Future Recommendations

In conclusion, this study provides an analysis of traditional medicine in Zanzibar. The focused sections and their relation to the goals already set in the Zanzibar Traditional and Alternative Medicine Policy is elaborated on in the hope that specific attention is given to public desires for the improvement of traditional medicine in Zanzibar as the regulation develops. The policy includes goals that, if met, would induce the expected positive changes in traditional medicine and secure its place in Zanzibar as westernization continues. Conservation of the natural resources has already begun through the nurseries established by the Department of Forestry and further collaboration between this department and the Ministry of Health would help to continue this effort and improve the conservation of medicinal plants. As the Traditional Medicine and Alternative Care Unit is limited in staff and resources, pairing with the Department of Forestry could progress the speed at which the goals of the Zanzibar Traditional Medicine and Alternative Health Policy are met. In order to improve this study, an increased sample size of both locals and healers would be helpful. Such a small sample size cannot accurately represent the populations of the villages surveyed and only acts a preliminary scan for patterns related to traditional medicine and its use in Zanzibar. Further studies could also focus on the methods of education for Zanzibar inhabitants on the necessity of natural resource conservation and on the legal policies pertaining to traditional medicine. Furthermore, the continuation of a local Zanzibar

pharmacopeia would prove invaluable for the improvement of education and overall traditional medicine use in Zanzibar.

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# Appendix

Appendix A- Questionnaires used during this study.

**Questionnaire for locals**

***Note that (a) versions of questions is when the answer to question number 2 is yes while (b) is if they answered no for question number 2.**

1. English (E)-
   When you become ill, do you self-treat, go to the hospital for medicine or go to a traditional
   healer?
   Kiswahili (K)-

   Unapoumwa, unajitibu mwenyewe au unakwenda hospitali au unakwenda kwa mganga wa kienyeji?

1. E-
   Do you use traditional medicine?
   K-
   Unatumia dawa ya kienyeji?

3(a). E-

What are the top five plants you most commonly use for medicinal purposes?

K-

Maomba unitajie mimea mitano ambayo kwa kawaida unatumia kama dawa?

3(b). E-

Do you know of any plants commonly used for medicinal purposes?

K-

Unajua mimea ghani watu wanatumia kwa dawa?

4. E-
   What are they used for and how are they used?

   K-

   Hi mimea ulonitajia unaitumia leufanya nini? Na unatumia vipi?

5. E-
   Where are these plants/treatments found? Ie- collected yourself or provided by healer?
   K-

Hi mimea inapatikana wapi? Na hizi njia za kutibu unazipata wapi (unapata mimea kwenyebustani au kwa mganga wa kienyeji, njia za kutibu unapata kwa mganga au unazyua mwenyewa)

6. E-
   Are some plants disappearing?
   K-
   Kuna mimea ambayo inapotea? (mimea ambayo unatumia imabadilika au haya badilika?)
7. E-
   Has traditional medicine changed? If so, how?
   K-
   Kwa mwangalio wako hizi dawa za kienyeji zimebadilika? Kama ndio, zimebadilika vipi?

8(a). E-

Are there any problems with traditional medicine here?
K-
Unakabiliana ma matitizo yoyote unapotumia dawa za kienyeji?

8(b). E-

Have you heard of any problems with traditional medicine?

K-

Yapo matatizo ambayo yanakusika na dawa ya kinyeji?

9. E-
   Do you think traditional medicine should be regulated?
   K-
   Kwa mwangalio wako unahizi vipi kama dawa za kienyeji zikiekewa sharia (unadhani dawa za kienyeji ziekewe sharia?)
10. E-
    Where does your family originate from?
    K-
    Familia yako inatokea wapi?
11. E-
    What level of education do you have?
    K-
    Umefika darasa la ngapi?
12. E-
    How old are you?
    K-
    Una mwaka ngapi?

**Questionnaire for Traditional Healers**

1. E-
   What are the most commonly used plants for medicinal purposes?

   K-

   Mimea gani ambayo kawaida inatumiwa kwa dawa?

2. E-
   What illnesses do they treat? How are they used?
   K-
   Inatibu maradhi gani? Unatumia vipi?
3. E-
   What illnesses do you treat most often?

   K-

   Maraghi gani unatibu kwa kawaida?

4. E-
   How do your plants treat those illnesses (what about their properties makes them work?)
   K-
   Mimea hi unayotumia yanatibu vipi haya maradhi?
5. E-
   How do you obtain the plants for medicine? Imported? Grown yourself?
   K-
   Vipi unapata hiyo mimea? Inaletwa kutoka nje? Unaotesha mwenyewe?
6. E-
   What is your opinion of the status of traditional health care in Zanzibar?
   K-
   Mwangalio wako ukoje katika dawa za kienyeji Zanzibar? Hasa katika uponeshaji wa afya?
7. E-
   Are there any problems facing your profession?
   K-
   Unakutana na matatizo yoyote katika kazi unayo fanya?
8. E-
   Are you a registered healer?
   K-
   Umejiandikisha katika shughuli ya kuuguza?
9. E-
   Where is your family from (origin)?
   K-
   Familia yako inatoka wapi?
10. E-
    How old are you?
    K-

Una mwaka ngapi?

11. E-
    Is there anything else concerning traditional health care which you feel I should know?
    K-
    Kuna kitu chengine chochote ambacho kinahusiana na dawa zw kienyeji unafileiri natakiwa nijue?

**Questionnaire for Department of Forestry**

1. Does forestry contribute to traditional medicine in Zanzibar?
2. Have there been any adverse impacts from sourcing medicinal plants for use in traditional medicine? For example- is there any disappearance of plants? (elaborate)
3. Are you aware of the Zanzibar Traditional and Alternative Health Unit and its policy?
4. Are there any conservation efforts currently targeting the conservation of medicinally used plants?
5. Do you use traditional medicine yourself?
6. What is the fate/future of traditional medicine In Zanzibar

**Questionnaire for Traditional Medicine and Alternative Health Unit**

1. How long have you been working in the Traditional and Alternative Health sector?
2. How has the traditional medicine policy been implemented since its promulgation in 2008?
3. What are its positive and negative aspects of the policy (from personal point of view as well as policy making approach)
4. Which section do you find the most useful for overall function of traditional medicine?
5. Has traditional medicine changed since the policy was created in 2008? How so?
6. Why has there been no law to legalize the policy as is the case in Tanzania mainland
7. Are there any impacts on the conservation of resources resulting from utilization of plants for traditional medicine?
8. How do you evaluate the performance of traditional healers? How genuine are they?
9. What work is being done to integrate traditional and western medicine?
10. Do you use traditional medicine yourself?

Appendix B. List of Kiswahili Terminology and Phrases Commonly Used during the Study.

| USEFUL KISWAHILI WORDS AND PHRASES TO KNOW FOR THIS STUDY |
|---|
| **Dawa- Medicine** |
| **Dawa ya Asalia- Traditional or local medicine** |
| **Dawa ya Kienyeji- Local medicine that refers to spiritual healing specifically** |
| **Dawa ya Mimea- Herbal medicine, based solely on healing properties of plants** |
| **Kilinge- Smaller than a clinic, "office" of waganga to treat patients** |
| **Mganga- Local healers** |
| **Mjini- Town, commonly refers to Stone Town** |
| **Mshepa- Hernia, stomach pain** |
| **Nunguu- Mixture of plants that is boiled and then the steam of the mixture is inhaled** |
| **Shamba- Rural areas, farmland** |
| **Shetani- Devil or spirit** |
| **Waganga- Plural of mganga** |

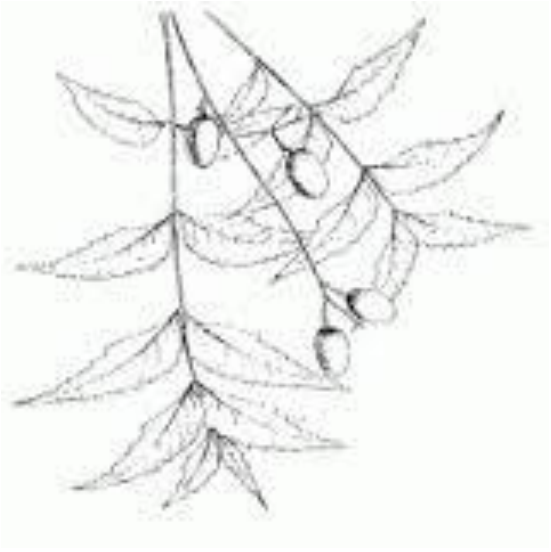
Appendix C- Identification of Plants Mentioned as Missing or Lost by Both Healers and Locals.

| **Kiswahili Name** | **English Name** | **Scientific Name** | **Village(s) mentioned** |
|---|---|---|---|
| Gigilani (Manjano) | Turmeric | *Curcuma domestica* | Stone Town |
| Karafu | Cloves | *Syzygium aromaticum* | Stone Town |
| Kivumbasi | Mosquito Brush | *Ocimum suave* | Stone Town, Bububu, Pete |
| Mbaazi | Pigeon Pea | *Cajanus cajan* | Stone Town |
| Mbono | Physic Nut | *Jatropha curcas* | Stone Town, Mangapwani |
| Mbuyu | Baobab Tree | *Adansonia* | Bububu |
| Mcha kuzi | Unknown | Family Annonaceae | Stone Town |
| Mchanda (Mchamnda) | Madagascar Periwinkle | *Vinca rosea/ Catharanthus roseus* | Pete |
| Mchofu | Unknown | Family Annonaceae | Stone Town |
| Mfagio | Broom Plant | *Sida acuta* | Mangapwani |
| Mgaragara paka | Flannel Weed | *Sida cordifolia* | Stone Town |
| Mkaati | Coastal Golden Leaf | *Bridelia micrantha* | Stone Town |
| Mkaumwa | Cedar Mangrove | *Xylocarpus garanatum* | Stone Town |
| Mkokoa | Cocoa | *Theobroma cacoa* | Stone Town |
| Mkunazi | Buffalo Thorns | *Sisyphus mauritiana* | Stone Town |
| Mkwaju | Tamarind | *Tamarindus indica* | Stone Town |
| Mlingani | Unknown | Unknown | Mangapwani |
| Mnamia maji | Bleeding Heart | *Clerodendrum spp.* | Bububu |
| Mnanuzi (Mdaka komba) | Orange Climber | *Toddalia asiatica* | Mangapwani |
| Mnazi | Coconut Tree | *Cocos nucifera* | Stone Town, Pete |
| Mnusi | Unknown | *Maytenus mossambicensis* | Stone Town |
| Mpambawake | Lemon Bush | *Lippia asperifolia* | Stone Town, Bububu, Mangapwani |
| Mpera | Guava | *Psidia guajava* | Bububu |
| Mronge (Mbronge) | Ben Tree | *Moringa oleifera* | Stone Town, Bububu |
| Mrushajini | Small Lantana | *Lantana salviifolia/ Lantana rugose* | Stone Town |
| Mshinduzi | Forest Fever Berry | *Croton sylvaticus* | Stone Town |
| Msoo (Mkomwe) | Grey Nicker | *Caesalpinia bonduc* | Stone Town, Mangapwani |
| Mtule | African Mint | *Ocimum canum* | Stone Town, Pete |
| Mtumbaku mwitu | Unknown | *Vernonia zanzibarensis* | Stone Town |
| Mtunda (Mwarobaini) | Neem Tree | *Azadirachta indica* | Bububu |
| Mtundakanga (Mshetakanga) | Love Vine | *Cassytha filiformis* | Bububu |
| Mtunguja | Bitter Apple | *Solanum incanum* | Stone Town |
| Muavi kali | Horsewood | *Clausena anisata* | Stone Town |
| Mvuje (Mvuje mwitu) | Coral Knobwood | *Zanthoxylum holtzianum* | Pete |
| Mvule | Iroko | *Milicia excelsa* | Stone Town, Pete |
| Mvumo | African Fan Palm | *Borassus aethipum* | Stone Town |
| Mvunja shoka | Sickle Bush | *Dichrostachys cinerea* | Stone Town |
| Mzalianyuma | Stonebreaker | *Phyllanthus niruri* | Stone Town, Bububu |
| Mzambarau | Unknown | *Syzygium cumini* | Stone Town |
| Pili pili | Chili | *Capsicum* | Stone Town |
| Popoa (Popo) | Unknown | Unknown | Stone Town |
| Tangawezi | Ginger | *Zingiber officinale* | Stone Town |

Appendix D- Local Pharmacopeia of Unguja Island, Zanzibar

# 1. *Azadirachta indica*

http://www.jatropha.pro/neem.htm



http://www.nap.edu/openbook.php?record_id=1924&page=24

## English Name:

Neem Tree

## Kiswahili Name(s):

Mtunda, Mwarubaini

## Physical Characteristics:

*Azadirachta indica* is an evergreen tree that ranges in height of 15 to 20 meters. Its trunk is stout with a normal girth of 1.5 to 3.5 meters and hard textured bark. Roots are lateral with one main taproot. It is a highly vesicular-arbuscular mycorrhiza dependent species. The leaves are characterized by their medium to dark green color and asymmetrical shape when mature. They are unpaired and pinnate.

## Distribution:

Originated from South Asia and can now be found in Mara and all of Africa. It tends to grow best in tropical and subtropical zones of Asia, Africa, the Americas, Australia and South Pacific.

## Chemical Components:

*Azadirachta indica* contains terpeniod constituents: protolimoniods, limonoids, pentatriterpenoids and hexatriterpenoids. It also contains non terpenoid constituents: hydrocarbons, fatty acids, steroids, phenold, flavonoids and others.

**Found in seed oil**

Seed oil contains nimbin mp 192°, nimbidin mp 90°, sulphurous compounds, asadirachtin and salannin.

**Found in essential oil of flower**

The flower essential oil contains tetrasulphides, kaempferol, thioamyl alcohol, benzyl alcohol, benzyl acetate and unknown alcohol

**Found in leaves**

The leave most noticeably contains quercetin, nimbosterol and limoniods. Included among the limioniods are nimbin, nimocinolide and isonimocinolide. The leaves also ontain proteins, carbohydrates, minerals, calcium, phosphorus, vitamin C, carotene as well as trace amounts of glutamic acid, tyrosine, aspartic acid, alanine, praline, glutamine, amino acids and fatty acids

**Found in trunk bark**

Bark contains polysaccharides, bitter elements margosine and 6-desacetyl nimbinene, nimbin, nimbinin and tannins.

## Ethno Medical Properties:

Neem is reportedly used for treatment of HIV/Aids, digestive system problems, skin diseases, dental pain, sexually transmitted diseases, treating open wounds or sores and as a form of birth control.

## Pharmacological Properties:

Found to have antimalarial, immunomodulatory, antifungal, antiviral, anti-inflammatory, anti-parasitic and antibacterial characteristics. It is also an antiyeast, anthelminthic, antifilarial, antimematodal, antipyretic, antispermatogenic, hypercholesteremic, antitumor and antispasmodic agent.

## Toxicology:

*Azadirachta indica* can cause abortions and should not be used by pregnant women.

## Other Properties:

Used as a pesticide, fertilizer and insect repellent.

## Uses reported during this study:

For malaria and fever, boil the whole plant, leaves or bark then either drink or wash the whole body. The same preparation can be drunk as a treatment for tonsillitis or stomach issues. For fever, this plant is also added to a mixture of plants, or nunguu, and the steam of the mixture is breathed in. A soap made of this plant can also be used to treat stomach problems.

## Side effects reported during this study:

None

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# 2. *Solanum incanum*

http://www.visoflora.com/photos-nature/photo-solanum-incanum.html http://www.prota4u.org/protav8.asp?p=Solanum+incanum

## English Name:

Bitter Apple

## Kiswahili Name:

Mtunguja

## Physical Characteristics:

This is a perennial herb or small branched shrub. The sizing ranges from 1 to 3.6 m. Stems are covered in soft bristles, are approximately 8 mm long and dark violet in color. The leaves are alternate and oval in shape with pointed tips and narrowing at the base. The fruits are small green, yellow or white.

## Distribution:

Native to Africa, it is found widely in Kenya. *Solanum incanum* can also be found in savanna woodland or grassland of SW Asia and North Africa.

## Chemical Components:

This plant contains the following saponins: dioscin, protodioscin, methyl-protodioscin and indioside D. It is also reported to contain one recently discover saponin. It is also reported to contain solamargine, a steroid glycoalkaloid.

### Found in fruit extracts

The fruit of *Solanum incanum* is comprised of phenol compounds

## Ethno Medical Properties:

*Solanum incanum* has been used by some to treat jaundice and chronic liver diseases, the latter reportedly a practice of Chinese medicine in Taiwan.

## Pharmacological Properties:

It is a known anticancer agent due to its ability to induce apoptosis. It is also reported to have antioxidant, cytoprotective and antimicrobial characteristics. *Solanum incanum* has also been claimed to have hepatoprotective properties, however further research must be done to confirm those properties.

## Toxicology:

The chemical constituent solamargine has been reported to cause mortality when used in dosage greater thatn 35 mg/kg body weight in animal experiments. Care should be taken so as to avoid an overdose of this compound.

## Other Properties:

Fruit extracts were found to be useful in preventing cattle ticks when applied at a 5% concentration.

## Uses reported during this study:

It helps to treat stomach aches, gas, swelling and fever when the roots of this plant are boiled and then drank. The roots will treat throat and nasal problems when eaten raw. The bark can be used to brush the teeth or boil and drank for tooth pain.

## Side effects reported during this study:

It may cause diarrhea.

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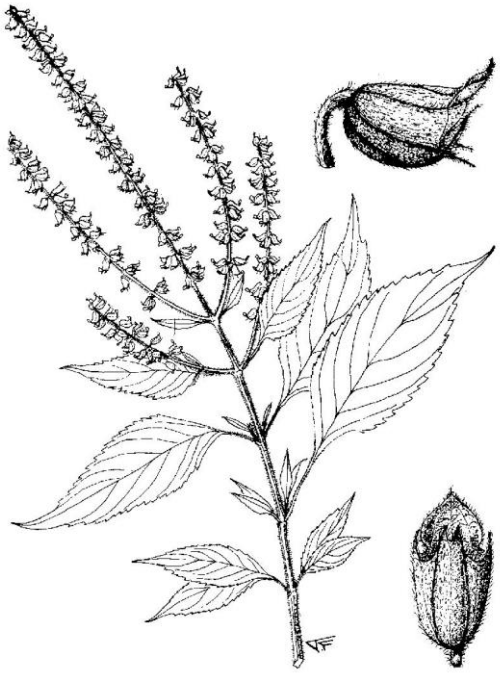
# 3. *Ocimum suave*



http://www.africamuseum.be/collections/external/prelude/view_plant?pi=09190

## English name:

African Mint, Wild Basil

## Kiswahili name:

Mtule

## Physical Characteristics:

*Ocimum suave* is a semi-woody herb that grows to approximately 40 cm high.

## Chemical Components:

Overall, found to have triterpenes, flavonoids, sugars, phenols, and sterols with multiple bonds.

### Found in essential oil

In the essential oil, there has been found methyl eugenol, eugenol, linalool, linalyl acetate, β-Pinene, Cis-β-ocimene, unidentified sesquiterpene, β-Caryophyllene, β-Cubebene and β-Bisabolene

**Found in leaves**

Phenols and triterpenes, specifically oleanolic acid, β-sistosterol, stifmasterol and phytol have been reported as constituents of the leaves.

## Ethno Medical Properties:

It has been reported to treat ulcers, fever, pain, inflammation, stomach ache and bronchopneumonic infections. Also extracts of plants have been used for treatments of coughs, eye and ear problems and stomach pains.

## Pharmacological Properties:

Found to have antioxidant, prophylactic, anti-microbial, anti-inflammatory and ulcer healing properties.

## Toxicology:

Research done has concluded that *Ocimun suave* is safe for acute and chronic use with no inhibition of reproduction or toxic effects.

## Other Properties:

*Ocimum suave* is used as flavoring for tobacco, body perfume, and its branches are burned as a mosquito repellant. It was found to be particularly efficient as a toxin to prevent cowpea bruchid infestations. The oil also has reputable mosquito repellant properties due to the active compound eugenol.

## Uses reported during this study:

The bark is used is brush the teeth. The roots or leaves can be boiled and drank to treat stomach pains. The roots can also be left to soak in water, and then the water drank for headaches. When the leaves are soaked in water, the water is then rubbed on the body to treat fever. This specific treatment is mostly used for children.

## Side effects reported during this study:

None

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