

Use Of Vernonia Plant For Home-Based Malaria - Treatment In Rural Uganda: The case of Nyimbwa sub-county, Luweero District.

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Abstract

The study investigated the various methods of preparation, dosage, frequency of intake and use of Vernonia plant for home-based treatment of malaria. Malaria, caused by Plasmodium and transmitted by Anopheles mosquito, is a common debilitating ailment throughout Uganda and a major hindrance to development. Despite anti-mosquito and anti-plasmodium control measures, the disease is still a big threat. Ugandans usually use local herbs before seeking pharmaceutical drugs in clinics and hospitals. Natural plants, Vernonia (*Vernonia amygdalina*) inclusive, have been reported to have anti-plasmodial properties and have been effectively used for decades to control malaria. Fresh or boiled juice from crushed leaves, bark, or roots of Vernonia are used to treat malaria in the home. However, the quantity of the fresh material to crush and dosage needed for cure is neither known nor scientifically documented thus the need for this study. A library exploratory study was followed by an experience survey of key informants on the use of vernonia as a medicinal plant. Key informants included interviews of researchers from the Schools of Botany and Pharmacology at Makerere University and local herbalists in the selected villages. The researcher also did systematic observations of availability and growth of vernonia plants. The study sample of 180 respondents randomly selected from three villages per parish and 10 homesteads per village of the 6 parishes in Nyimbwa sub-county were each requested to answer a questionnaire about use of vernonia for malaria treatment. Findings indicate that people just estimated the number of vernonia leaves picked for preparation of the concoction for malaria control and that there were widely divergent methods of preparation of Vernonia for oral administration as majority of respondents (60%) said they crushed vernonia leaves in water, (24%) boiled its bark and roots and (12%) boiled the leaves. There was inconsistency in dosage with 65% drinking one mug (half litre) of vernonia concoction, and (65%) taking 1 cup of quarter a liter, while others took 1 tablespoonful or teaspoonful of the concoction. Frequency of administration of the drug depended on the decision of individuals whereby majority (53 %) took the bitter concoctions only once and only repeated if fever re-occurred. A few (20%) took the medicine 3 times a day for three days just like manufactured anti-malarial drugs, and 11% would take the concoction once a day for 7 days. It is concluded that Vernonia plant, which naturally grows abundantly in Uganda especially the rural areas is widely used as anti-malarial medicine in the home. Preparation, dosage, and frequency of intake differ from homestead to homestead and person to person. Lack of a standard to ensure adequate intake is a hindrance to effectiveness of vernonia as home-based treatment of malaria.

Background to the Study

The study was among the first to be funded by Ndejje University Research Programme, managed by the School of Post Graduate Studies. The investigation focuses on use of *Vernonia* plant for home-based treatment of malaria and concentrated on the various methods for preparation, dosage and frequency of taking the plant extracts. *Vernonia amygdalina* is found all over Uganda as indicated by its various names, namely; ‘*Mululuuza*’ (Luganda), ‘*Mubirizi*’ (Lunyankole), ‘*Labori*’ (Acholi), ‘*Mululisi*’ (Lugishu), *Okelo-okelo* (Madi), *etutum* (Iteso), *Echero* (Lugbara). It is also known as ‘*Bitter leaf*’ in common English (Katende et al 1995).

Malaria is a common, debilitating ailment throughout Uganda and is a major hindrance to development. Much as development programmes like Poverty Eradication Action Plan (PEAP), Plan for Modernization of Agriculture (PMA) and National Agricultural Advisory Service (NAADS) have been put in place in the effort to alleviate household poverty, Ugandans cannot effectively take part because most of them repeatedly suffer from malaria. The protozoa that causes malaria is transmitted by the anopheles mosquito. Anti-anopheles mosquito control include cultural methods like slashing bushes or removal of stagnant water, while physical methods include sleeping under mosquito-nets and blocking entry by putting wire- nets in windows and ventilators. These methods are effective while in doors but majority of Ugandans cannot access netting and also stay outdoors early in the morning and late at night and thus get stung by the mosquitoes; thus making current preventive methods inadequate in the control of both the vector and the disease. (Plantlife 2008). Chemical control methods like use of DDT as indoor residual sprays (IRS) are environmentally controversial and might also cause resistance in the mosquitoes. Anti-plasmodia methods are based on using pharmaceutical drugs and these have failed because majority of Ugandans cannot afford regular full doze of the drugs. Furthermore the ratio of Western Trained Practitioners is 1:25,000, while that of traditional healers is 1: 290 (WHO 2002), making traditional healing much more accessible to the ordinary Ugandan than trained medical practice.

Hundreds of natural plants in Uganda, *Vernonia amygdalina* inclusive, have been reported to have anti-plasmodial properties and these have been effectively used for decades to control malaria. Protabase (2010) reported that *Vernonia* is commonly used as traditional medicine in Benin, Cameroon, Gabon and DR Congo, whereby leaf decoctions are used to treat fever, malaria, diarrhea, dysentery, hepatitis, cough and as a laxative and fertility inducer. According to Katende et al (1995), *Vernonia*, which belongs to family composite, is a single-stemmed wooden shrub which grows up to 10m high and has pale grey rough bark. It grows in sub-humid wooded Savannah, especially as a secondary shrub, though it can also invade cultivated area, forest edges, and thickets. The leaves are ovate, can be 10cm long, tapering at both ends and widely toothed. See photo 1. It has whitish green flowers, each only 6mm across, and sweetly scented in the evening. Seeds are tiny with white hairs. Protabase (ibid) also reported that the bitterness in *Vernonia* is due to sesquiterpene lactones, vernodalin, vernolapin, vernomygdin and steroid glucosides (vernoniosides) and that these compounds have anti parasitic activity especially vernodalin and vernoniosides BI. It was further reported that vernodalin and vernomygdin have cytotoxic activity. The same source indicated that the leaves, roots and bark of *vernonia* showed anti-malarial activity against *Plasmodium berghei* in vivo in mice and against *Plasmodium falciparum* in vitro. (Protabase ibid)

Onegi (2002) indicated that little has been done in Phytochemical research on *Vernonia* in a systematic manner. This would involve obtaining extracts, identification of groups of or individual active agents, their proportions and stability in the plant or plant preparation. She, however, carried out Pharmacological research at Mulago, using extracts of the plant on *Plasmodium faciparum* and found that only the lipophilic extracts of *Vernonia* showed activity against the plasmodium.

The Study Problem.

Ugandans usually use local herbs before seeking pharmaceutical drugs in clinics and hospitals (Monik 2006). Fresh or boiled juice from crushed leaves, bark or roots of *Vernonia* is drunk to cure malaria. However, the quantity of the fresh material to crush in order to have curative dosages is not known. Onegi's (2002) pharmacological research on

vernonia did not include consideration of the various methods of preparation of the drug, frequency intake, dosage and the effect this could have on the active ingredients. Unhygienic and differing methods of preparation, incorrect doses and wrong frequency of administration of this herb might affect the efficacy of the concoction and pose a danger to people who use it. In some cases, the pathogen might even develop resistance to the drug. In addition, traditional knowledge about local medicines is rapidly disappearing with the demise of the elderly who knew it (Lambert et al 1997); coupled with the fact that modern thinking and religions rarely value or encourage use of local medicines. At the same time, medicinal plants are also facing extinction due to unsustainable harvesting and intensive development of rural areas into housing estates and other non-farm uses (Lambert ibid). These factors have caused extensive clearance and destruction of vegetation including Vernonia.

The study focused on use of Vernonia plant for home-based treatment of malaria in the home and concentrated on investigating various methods used in preparation of Vernonia for oral intake, the dosage and frequency of taking the concoction..

Study Objectives were:

1. To assess the availability of *Vernonia* (*Vernonia amygdalina*) in the locality.
2. To identify people's attitudes towards use of Vernonia in the area.
3. To document the most used parts of the medicinal plants for malarial control, and the possible effect harvesting of these parts might have to the plants.
4. To document the methods for preparation, dosage and frequency of taking vernonia concoction.

Methodology

The study was carried out in Nyimbwa sub-county in Luwero District, in Uganda. Qualitative and quantitative approach were used, namely library research, key informant interviews, field observation and questionnaire method. A library exploratory study was followed by an experience survey of key informants. These included interviews of researchers from the Department Pharmacology at Makerere University. The researcher also did systematic observations of availability and growth of vernonia plants. The study sample of 180 respondents randomly selected from three villages per parish and 10 homesteads

per village of the 6 parishes in Nyimbwa sub-county were each requested to answer a questionnaire about use of vernonia for malaria treatment.

Sample Selection.

The sample was made up of respondents from 6 parishes of Nyimbwa sub-county. Three villages per parish and 10 homesteads per village were randomly selected to make a total of 180 respondents. A visit to the Gombolola Chief of Nyimbwa Sub-county was made in order to get the names of the six (6) Parishes in the sub-county and the names of the Local council 1 villages thereof. Selection was done per Parish. Three (3) villages per Parish were selected by writing each village on a piece of paper. Each paper was then folded, placed in a basket and they were all mixed up thoroughly. With blind-folded eyes, the researcher selected 3 villages. The procedure was repeated per parish, making a total of 18 villages for the study. A visit was then made to each village Chairman of the selected village because these have good knowledge of the people. The village Chairman helped to identify and select homes with, at least, a bit of wasteland or forest where Vernonia might be growing. These formed a new list, with numbering 1 to N where N was the total number of households with wasteland or forest. A selection interval (I) was established according to Casley and Kuwar (1992). The systematic sampling selection interval I is represented as $N/n = 1$ where:

N = total number of households with wasteland and / or forest (this differed for each village)

n = number of households desired in the sample (10 in this case)

I – selection interval

This was followed by first choosing a random number (P) between 1 and I (this was 2 and was common for all villages). The household having the number 2 became respondent number 1 (one) from that village. The second respondent was obtained by adding P to the selection interval (P+I), until P+N, which gave the 10th household to be interviewed in a particular village. For example, for village 1, the total number of respondents with wasteland was 30, so the selection interval was $30/10 = 3$. If the first respondent was the second one in the Chairman's list, then the second respondent was obtained by adding 3 to 2 = 5. The subsequent ones were 8, 14, 17, 20, 23, 27 and 30.

The method was repeated for all 18 villages yielding a total of 180 homes for the study sample.

Major Findings.

Vernonia was found abundantly growing in the wild in the study area. A picture of the plant appears in photo 1.

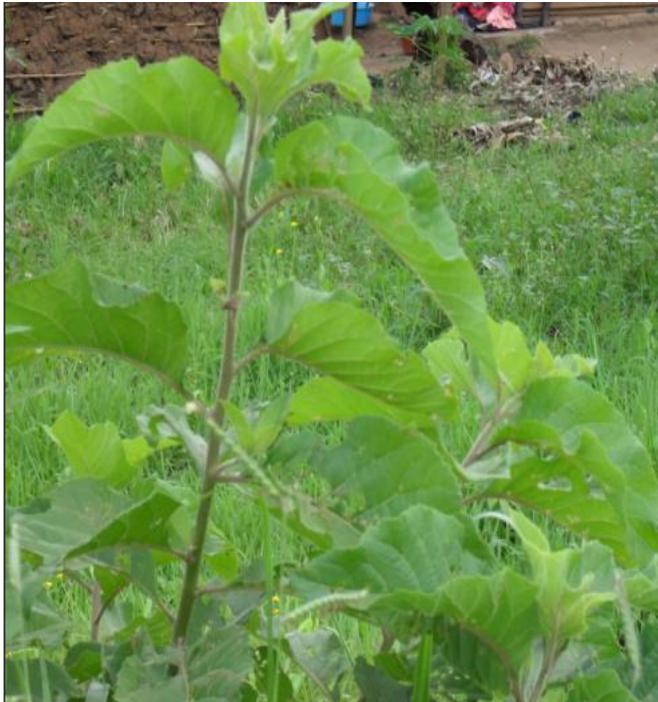


Photo 1: Broad-leaved Vernonia plant

Source: Field Data 2008

Opinion about use of local medicine.

A respondent who is a “medicine- woman” stated that there were some diseases which could not be cured by factory-made drugs; in which case, one had to use local medicines. There was also another view that it was only the paraphernalia put on local medicine by various local medicine people that spoils it, otherwise local medicines are good.

Table 1 shows that majority of respondents (87%) regarded local medicines as ‘helping those who can’t afford factory drugs; or used as a first aid before one goes to the doctor. Very few (9%) acknowledged that local medicine could save people from bad effects of

the factory made drugs. Three percent (3%) indicated that local medicines were for old people or even satanic. Three of the respondents (2%) indicated that they regarded local medicines as revitalizing to the body and something that protects the body from a number of diseases especially if taken as a prophylactic.

Table 1: Respondents' Opinions about use of local medicines

Opinion	Frequency	Valid Percent
Satanic	2	1
For old people	3	2
Helps those who cant afford factory drugs	142	87
Saves from bad effects of drugs	14	9
Revitalizing and prophylactic	3	2
Total	164	100

Source: Field data. 2008

Number of leaves used.

Of the 164 respondents who answered this question, 55% said that leaves were the most frequently harvested parts of vernonia for medicinal use. However, 31% cited use of roots, although they said that roots were added to leaves for medicinal purposes. Use of the bark of vernonia was mentioned by 11% of the respondents.

There were a lot of divergent answers as to the amount of leaves picked for treatment of the sick. Most respondents (76%) indicated that they picked all leaves from a few selected branches on the plant, as shown in table 2. Very few (10%) used the plant destructive methods of breaking off branches and picking leaves or uprooting a young plant and removing the needed leaves (5%). Some respondents (9%) said that they just estimated a handful of vernonia leaves consisting of 4 – 6 leaves depending on their size. Other respondents said they estimated the amount of leaves which they ‘felt’ would be enough for medicinal purposes. Yet another said she picked enough leaves to fill up a small basin ‘akataasa’, which would be equivalent to about 40 mature leaves, while

another said she picks 15 – 20 leaves. One respondent believed that local herbs could never be an overdose and she would therefore pick any amount.

Table 2: Number of leaves harvested

How harvested	Frequency	Valid Percent
Break branch and remove a few leaves	16	10
Pick all leaves from some branches on the plant	124	76
Uproot the young plant and remove the leaves I need	8	5
Estimated handful (4-6) leaves	14	9
Picked enough to fill small basin	1	0.6
Total	163	100

Source: Field data. 2008

Methods of preparation for oral administration

There were widely divergent methods of preparation of Vernonia for oral administration. Majority of respondents (60%) said it is “*crushing vernonia leaves in water*” (Photo 2). Boiling of its bark and roots was cited by 24%. (Fig.1). Very few (12%) were boiling leaves in water for oral administration because as one observed, this would be too bitter! Some respondents (4%) crushed the leaves and administered the unadulterated froth especially to very young sick children who can’t take large volumes of the bitter extract.

Preparation of vernonia for surface administration was mainly by crushing the leaves and washing the whole body, according to 79% of the respondents. This, they added, reduced the high temperature of the patient. A few of the respondents (15%) stated that they crushed vernonia leaves in water and repeatedly poured the solution over the aching head. Other respondents (6%) said that if vernonia leaves were crushed and the froth smeared over the body of a child suffering from measles, to help bring out the measles.

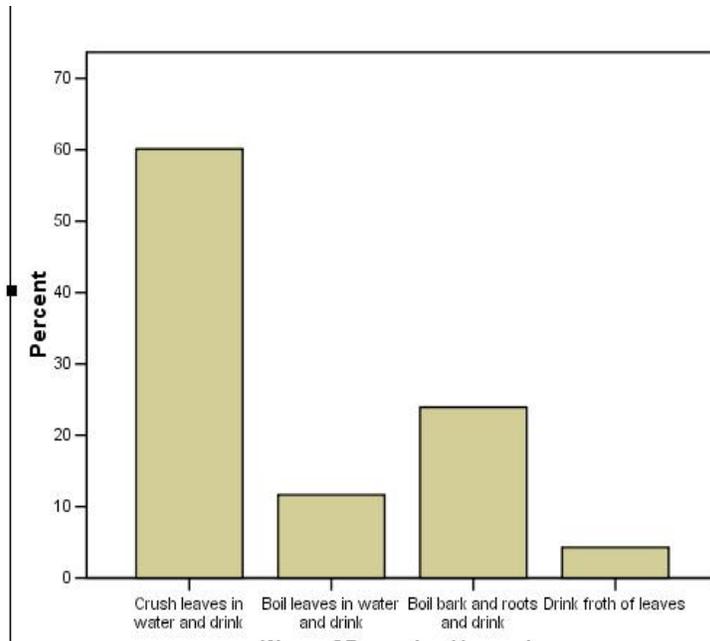


Fig. 1: Preparation of Vernonia for Oral Administration

Source: Field data. 2008

One traditional healer recommended that if the fever was too high then he warmed vernonia concoction, dipped a cloth in it and repeatedly passed the moist cloth over the sick person. He added that the concoction must be warm otherwise the patient might go into convulsions. The same treatment would help in the control of ‘*eyabwe*’ which is believed to be very acute malaria in children and results into convulsions and death.

Some concern over the hygiene during preparation of Vernonia for oral administration was also apparent. Most respondents (83%) indicated that they never boiled the water in which they crushed vernonia leaves for oral administration; neither did they wash the leaves and roots first! The roots were usually just scraped to remove the soil and then boiled. Some 51% of the respondents indicated that after preparing the crushed concoction in a basin for bathing a sick child, they would give it a few drops to drink from the same basin before bathing the child. One respondent advised that if one had a very sick person, he should just scrape off the bark of vernonia and use it to wash the mouth of the sick person.

Dosage for treatment of malaria

There was also inconsistency in dosage for treatment of malaria with most respondents (65%) drinking one mug (half litre) of vernonia concoction as shown in figure 3. while 18% indicated they would take 1 cup of quarter a liter. Another 17% indicated they took 1 tablespoonful of the concoction and only 1% took one teaspoonful of the drug.

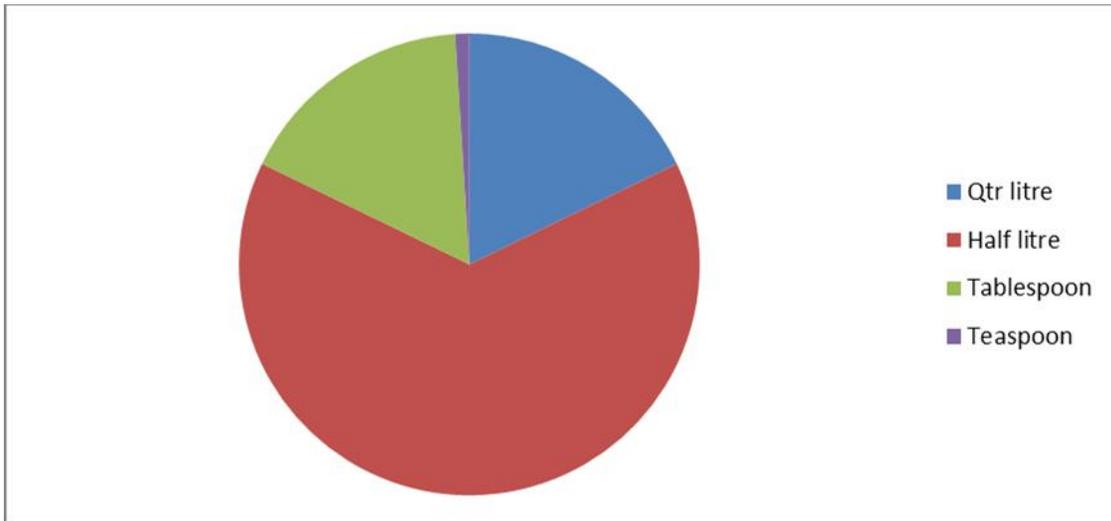


Figure 3: Dosage of Vernonia for treatment of malaria.

Source: Field data. 2008

Frequency of administration of Vernonia for treatment of malaria

Frequency of administration tends to depend on the decision of individuals, with the majority (54 %) taking the bitter concoctions only once and only repeating the doze if fever re-occurred (Figure 4).

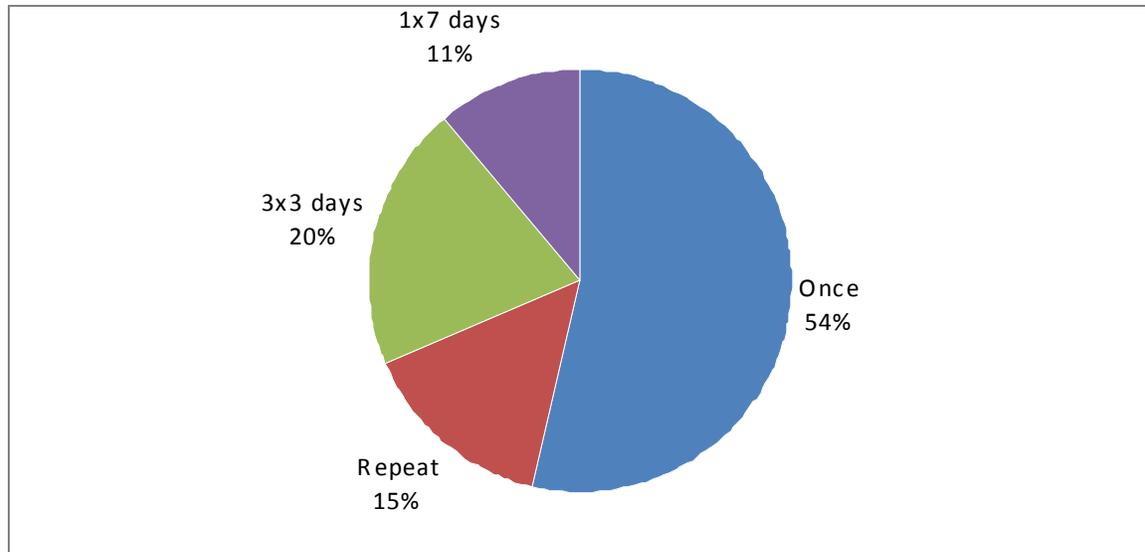


Figure 4: Frequency of administration of Vernonia for treatment of malaria.

Source: Field data. 2008.

Twenty percent (20%) indicated that they would take the medicine 3 times a day for three days as in the case with most factory made anti-malarial drugs, and 15% indicated they repeated the doze if fever re-occurred. Only 11% indicated they would take the concoction once a day for 7 days.

Discussion

Use of Vernonia for home-based treatment of malaria has been going on successfully for a long time in many homes in the study area as majority of respondents (87%), regarded local medicines as ‘helping those who can’t afford factory drugs’; or used as a ‘first aid before one goes to the mainstream doctor’. It is evident that people just estimated the number of leaves picked for preparation of the concoction for malaria control, as most of them (76%) indicated that they picked all leaves from some selected branches on the plant while others just estimated a number of leaves for preparation of the concoction for administering to the sick. There is therefore a danger of not picking enough leaves to provide the needed active ingredient to kill the malaria plasmodium in the blood.

Methods of preparation of Vernonia plant for oral administration were very divergent, with 60% of the respondents indicating that they prepared vernonia by crushing leaves in cold water before drinking the concoction, while others believed that crushing in warm or hot water increased the bitterness of vernonia, and yet others believed that boiling the leaves in water would destroy the active ingredients in the plant and adversely affect the efficacy of the drug. Preparation of Vernonia for surface administration also differed with most of the respondents crushing vernonia leaves with other medicinal plants and washing the whole body specifically for the purpose of reducing the high body temperature brought about by the fever. The danger here might be that pouring of cold liquid on a person having high body temperature might induce that person to develop convulsions and might lead to death.

The fact that dosage and frequency of intake were inconsistent among the respondents with most of them just arbitrarily deciding according to their convenience means that there is need to ascertain the correct measures for effective control of malaria. Taking the drug only once might not provide the required amount of active ingredient for the control of plasmodium in the blood. It might also be true that varying dosage and frequency of taking the drugs might affect its efficacy. There is also the danger of a sick person first taking a 'dose' of vernonia and then later going to hospital and is given conventional drugs like quinine or Artemesia, since the drugs might react dangerously to the patient. This is especially so when we consider that Ugandans always use traditional drugs as first aid before going to the hospital. Correct dosage and frequency of administration of the two drugs must be ascertained especially when we consider that most Ugandans cannot afford the costs of conventional drugs and so depend on traditional ones. This is given more weight when we consider that the ratio of trained doctors is 1: 10,000 in urban areas and 1: 50,000 in rural areas and yet the ratio of traditional healers is only 1: 290, making people more likely to get help from traditional healers in the village.

Conclusion.

Vernonia plant abundantly and wildly grows in the rural areas, has been found to be frequently used as anti-malarial drug in the home although the preparation, dosage and

frequency of intake still differs from homestead to homestead and from person to person. Lack of a standard to ensure adequate intake renders vernonia use less effective for home-based treatment of malaria.

Currently, Vernonia grows abundantly in the wild where anybody can access it. However, as land becomes more valuable and property development takes the priority, there is imminent danger of Vernonia becoming extinct.

Recommendations

There should be an awareness drive to encourage people to plant Vernonia in the home garden so as to conserve it and to render it easily available whenever it is needed for malaria control. There should also be intensive sensitization of people about the multitude of its other uses such as being used as firewood, as a toothbrush especially in cases where one suffers from toothache, as a vegetable and as a live fence to demarcate off portions of the farm or a boundary plant to mark land boundaries in addition to its use as an anti-plasmodial drug.

There should be efforts to grow Vernonia with other crops since it seems to make a good companion plant if inter-cropped. It can also be planted as a peripheral or boundary fence as was done by Mr. Oduki of Ggunda in Kiyanda parish, Nyimbwa sub-county, who has developed an effective fence of vernonia around his banana garden. Inclusion of Vernonia in the home garden set-up would also avail the people with a fodder and medicinal plant for poultry, rabbits, goats, pigs and cattle, (as recommended by Teguaia et al (1993) and Ssebina (1996), as well as being used for fuel, as an ornamental plant and the young leaves being eaten as a vegetable.

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