Artemisia Improving Livelihoods in Eastern and Central Kenya

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Abstract

Malaria has remained a major killer in Africa mainly to children under 5 years. Teachers, parents, pregnant and breast feeding mothers waste productive man-hours either being sick or taking care of their sick children instead of being gainfully employed. With resistance to chroroquine and sulfur based drugs the only alternative. WHO approved remedy is coartem (Artemisin Combination Therapy (ACT)) at 600 Ksh per dose in Kenya, too costly for majority. With scientifically approved efficacy of Artemisia tea in management of malaria in rural area among poor communities, it will reduce malaria burden for local communities ensuring malaria treatment at low cost. The study aimed at making Artemisia tea accessible malaria endemic regions in eastern Kenya, to campaign through posters, video and realia for Artemisia accessibility, to reduce incidences of malaria and its economic burden among poor vulnerable rural women. 50% farmers adopted this innovation at college proximity, School Absenteeism reduced, college grades improved. The Kenyan variety did better with more height at flowering, and flowered late than Brazilian variety that dwarfed at flowering and had less foliage subsequently fetching less in the market. Both varieties were attacked by white fly. The college supplied enough seeds and seedlings to all the contacts farmers as well as organizing seminars and workshops. Artemisia students have become more marketable. Most of the clients preferred processed tea to seedlings and seeds respectively. Artemisia therapy relieved other ailments such as joint pains, digestive discomfort loss of appetite, insomnia, epilepsy menstrual problems and stomach distress. In Thika technical the Artemisia therapy is covered via video learning and modules as short term course in alternative herbal medicine.

Key words: Antimalarials, *Artemisia annua,* Artemisinin, fertilizers, Malarial

1.1 INTRODUCTION

Over 50% of prescription drugs are derived from chemicals first identified in plants (Chandrasekhara, 2004). Interest in medicinal plants is becoming more recognized in health care delivery particularly in developing countries because they are affordable, readily accepted by consumers and locally available (Brown, 1994; Abbiw *et al.,* 2002; WHO, 2003). In many African countries, the significance of traditional medical practitioners is now recognized and attempts are being made to integrate western and indigenous medicine (Brown, 1994). It is estimated that 80% of the people worldwide depend on traditional medicine to meet their primary health care needs (WHO, 2003).

Malaria is a serious disease that affects more than 275 million people worldwide and is the cause of at least 1 million deaths every year (Butler, 1997). The rise of multi-drug resistant Plasmodium species and the pesticide resistance of the infection vector, the Anopheles mosquito, have made the eradication of this disease very difficult (Winstanley et al., 2002, https://www.youtube.com/watch?v=_vlKk6mOrYs). Concerns have been expressed recently about continuing increase in malaria cases and its impact on the socio-economic development of many countries in sub-Saharan Africa. It is reported that the annual economic growth of countries with intensive malaria is 1.3% lower than that of countries without malaria (Sachs and Malaney, 2002).

The anti-malaria compound remains expensive and hardly available on the global scale (Yadav et al., 2003). Field production of *A. annua* is recommended as the only commercially viable method to produce artemisinin since the total chemical synthesis of the molecule is complex and uneconomical (Yadav et al., 2003). The artemisinin content is highly concentrated in the leaves (Laughlin et al., 2002). Hence, this experiment was designed with the objective of creating awareness Artemisia tea and evaluating it effectiveness in fighting diseases and improving live hood of the rural vulnerable community. (https://www.youtube.com/watch?v=hksjaHE65EE)

1.2 STATEMENT OF THE PROBLEM

In terms of morbidity and mortality, malaria is still the most important parasitic disease of mankind and has a very serious impact upon health and economic welfare in the tropical world. The majority of malaria-related deaths occur in sub-Saharan Africa (Trigg and Kondrachine, 1998), where a large part of the population has no access to antimalarial drugs.

The rise of multi-drug resistant Plasmodium species and the pesticide resistance of the infection vector, the Anopheles mosquito, have made the eradication of this disease very difficult (Winstanley et al., 2002). There is therefore, need for a new strategy for developing these medicinal plants as commercial plants. Artemisia is one of the most important medicinal plants in this area of research of developing new strategies for medicinal plant production. *Artemisia annua* is a plant for the production of anti-malarial and

anti-bacterial agents and natural pesticides. (https://www.youtube.com/watch?v=NvA8bNnJKLQ, https://www.youtube.com/watch?v=URYc93NMreM).

1.3 JUSTIFICATION

Mbeere, Embu, Thika and Kirinyaga counties have suffered severe malarial attacks due to proximity to Mwea National irrigation board. Most areas are dry and rely on relieve food. Artemisinins have demonstrated therapeutic potential against several important infectious diseases, besides malaria. Plant Artemisia also is a good repellent and adds aesthetic value to the environment with its forest green color in addition to curbing Malaria.

1.4 BROAD OBJECTIVE

The study aimed at making Artemisia tea accessible malaria endemic regions in eastern (Embu and Mbeere) and Central Kirinyaga District Kenya, to campaign through posters, video and realia for Artemisia accessibility, to reduce incidences of malaria and its economic burden among poor vulnerable rural women and girls.

1.4.1 Specific Objectives

i. To evaluate adoption of Artemisia tea usage against malaria in eastern and central Kenya

ii. Establish effectiveness of Artemisia in reduction of incidences of diseases among the students

iii. Access the impact of Artemisia on school attendance

2. MATERIALS AND METHODS

2.1 DESCRIPTION OF THE EXPERIMENTAL AREA

Plant material A.annua of Kenyan variety and Brazilian variety was obtained from Kenyatta University. Reference specimens of the seeds and the leaves are available from the authors. The experiment was conducted in Rwika technical college; Embu County Kenya that is geographically located at 0° 34' 8.00"S, 37° 29' 32.00"E. Embu County is located in Eastern Kenya. Temperature range between 12 °C to 27. °C. average annual rainfall is 1495mm.

2.2 FIELD CULTIVATION

A field evaluation phenotypic characteristic of Artemisia of the Kenyan variety and Brazilian variety was used to establish germination percentage and flowering height. The seeds of A.annua varieties were provided by Kenyatta University. The seeds are very small (about 0.08 mg each) and were preserved in kaolin in sealed plastic envelopes. Seeds were sowed on soft, deep soil (depth 15 cm) enriched with compost. They were not covered with soil, but protected against rain- water, wind and excessive sun in a shady nursery, and watered carefully by spraying twice a day. Six weeks after germination the young plants were transplanted into plastic bags filled with fertile soil and protected from strong sunlight. After 6 weeks, they were transplanted into an open, unshaded field, with one plant per m_2. Seedlings were transplanted to main field at a density of about 70000 plants ha−1 (Ram et al., 1997, https://www.youtube.com/watch?v=hksjaHE65EE). Each crop treatment was replicated three times, using randomized block design. A crop treatment in a replication occupied 5m × 5m area at a spacing of 1x1 meter. Before transplantation, different treatments of manure were applied at a rate of 15 kg per planting hole. The crops were irrigated as and when required. Just before flowering, the leaves were harvested and dried under the shade at temperatures below 40°C. (https://www.youtube.com/watch?v=fLczQCGBu10)

2.3 THICK BLOOD FILMS EXAMINATION

Authority to undertake the study was obtained from Rwika ethical technical committee. Participation in research was voluntary, and therefore subjects gave their informed consent to participate in the research. Participants **t**hick blood films were examined after Fields staining in the college clinic, and trophozoites were counted in 100 high power fields (approximately 0.38 ml total) as described by Petersen et al. (1996). At Rwika technical, blood films were taken from every patient student at the beginning and at the end of the study period. The laboratory staff did not know whether the patient was included in the study or not.

2.4 SEMINARS TRAINING

The college supplied enough seeds and seedlings to all the contacts farmers as well as organizing seminars and workshops. The seminars and workshops for students were to create awareness of

Artemisia usage. Different methods of teaching were adopted by researcher that included posters, video and realia.

2.5 QUESTIONNAIRE ADMINISTRATION

Questionnaires were used to collect information from randomly selected respondents. Gay (1992) maintains that questionnaires give respondents freedom to express their views or opinion and also to make suggestions. The questionnaires were able to establish preferred method of teaching, acreage of Artemisia as raw material against malaria and Artemisia tea usage against malaria. The validity of the questionnaire was calculated by using the content validity Index Formulae. Kathuri and Palls (1993) argue that instruments with validity confident of at least 0.7 are accepted as valid in research. The study established validity confident of 0.8. The researcher computed the reliability for multi-item opinion questions using SPSS computer soft ware. The items were tested using Cronbach Alpha with validity confident of at least 0.7 being accepted as valid in research. The study established validity confident 0.85.

2.6 DOCUMENT ANALYSIS

The school register for the randomly selected students were reviewed to establish absenteeism before and after adoption of Artemisia tea project

2.7 METHOD OF DATA ANALYSIS

Data from questionnaires were compiled, sorted, edited, classified and coded into a coding sheet and analyzed using a computerized data analysis package known as Statistical Package for Social Science 17.0. The scores of the participants' questionnaire were coded and entered into a computer file. As Martin and Acuna (2002) observe, SPSS is able to handle large amount of data, and given its wide spectrum of statistical procedures purposefully designed for social sciences. The least significant difference (LSD) test at 5% was used to separate the means. Tables, figures and percentages were used to present the data.

3. RESULTS

Table 1: Adoption of Artemisia among different schools

			Qno.1.a		Total
			Yes	No	
Type.of.school	Boys school	Count	211	47	258
		% within Type.of.school	81.8%	18.2%	100.0%
	Girls school	Count	293	0	293
		% within Type.of.school	100.0%	0.0%	100.0%
	Mixed school	Count	143	0	143
		% within Type.of.school	100.0%	0.0%	100.0%
Total		Count	647	47	694
		% within Type.of.school	93.2%	6.8%	100.0%

The schools that were nearer the multiplication site (93.2%) adopted faster planting and usage of Artemisia tea as compared to those that were more than 5km from multiplication site. Growing of Artemisia was dependent on the type of school category ($p<0.001$). Number of shrubs planted was dependent on the type of school ($p<0.001$) where girls schools was leading with the highest number of shrubs. Own nurseries establishment among school categories was dependent on the type of school ($p<0.001$) with 99.3% of mixed schools having established they own nurseries.

Table 2: Usage of Artemisia tea among schools

		Qno.3								Total
		Diarrhea and Vomiting	HIV	Malaria	Pneumonia	Polio	Rabies	Small pox	Typhoid	
Boys school	Count	1	2	45	1	5	1	1	74	130
	% within Type.of.school	.8%	1.5%	34.6%	.8%	3.8%	.8%	.8%	56.9%	100.0%
Girls school	Count	0	0	109	0	0	0	0	0	109
	% within Type.of.school	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Mixed school	Count	0	0	103	0	0	0	0	1	104
	% within Type.of.school	0.0%	0.0%	99.0%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
	Count	1	2	257	1	5	1	1	75	343
	% within Type of school	.3%	.6%	74.9%	.3%	1.5%	.3%	.3%	21.9%	100.0%

Artemisia tea usage for different disease treatment was dependent on the type of school ($p<0.001$). In the three categories of schools, the highest percentage of students used Artemisia tea to treat malaria with girls' school using it exclusively (100.0%) to treat malaria. Artemisia was used in different Form that included tablet, liquid and Powdered. The drugs form usage was dependent on the type of school ($p<0.001$). Majority of the school categories preferred the liquid form which was available as Artemisia tea. Management of disease was dependent on the type of school ($p<0.001$). Majority, 96.9% of the respondents from mixed school category preferred herbal drug as compared to Coartim while, only 32.7% of respondent from boys school preferred herbal drug as compared to Coartim.

4. Discussion

1. To evaluate adoption of Artemisia tea usage against malaria in eastern and central Kenya

Growing of Artemisia was dependent on the type of school category ($p<0.001$). Number of shrubs planted was dependent on the type of school ($p<0.001$) where girls schools was leading with the highest number

of shrubs. The schools that were nearer the multiplication site (93.2%) adopted faster planting and usage of Artemisia tea as compared to those that were more than 5km from multiplication site. The risk of toxic effects from the use of this plant appears to be limited, since A. annua is included in the pharmacopoeia of the People's Republic of China, with recommendations for its dose and therapeutic use, and it may therefore be regarded as one of the established medicines in the present world. Adverse effects from pure artemisinin are minimal (de Vries and Dien, 1996, https://www.youtube.com/watch?v=NvA8bNnJKLQ, https://www.youtube.com/watch?v=6KV-Dj0IFMY)

2. Establish effectiveness of Artemisia in reduction of incidences of diseases among the students

Malaria patients treated with a tea from A. Annua, in a dose corresponding to the recommendations of the Chinese pharmacopoeia, showed a very rapid disappearance of malaria parasites from the blood, similar to the effect described for pure artemisinin (de Vries and Dien, 1996). Malaria parasite counts in the blood dropped rapidly, similar to the clinical effect described for artemisinin derivatives (de Vries and Dien, 1996, https://www.youtube.com/watch?v=NvA8bNnJKLQ)

3. ACCESS THE IMPACT OF ARTEMISIA ON SCHOOL ATTENDANCE

There was a drastic increases of attendance of student in all categories among the school categories ($P<0.05$). According to Carney (1998), a livelihood relates to the assemblage of activities, capabilities and assets required for people to make a living. The livelihoods of the poor are complex and dynamic, characterised by a wide range of activities that enhance household income as well as food security, health, social networks and savings (Shackleton *et al.* 2000).

5. CONCLUSIONS

The project increased networking, like in collaborative meeting held at St Stevens church, Kisumu on 19th March 2011 dealing with girls sanitary towels aiming at starting production at Rwika technical clothing and textile workshop. It resulted to local team build-up, where Rwika self help group boosted their mango production by blending it with Artemisial project. Rwika F1 Variety of Artemisia supplied to KARI-Embu served as Seed Bank for future research. Other sub-projects mushroomed e.g. Bakery, Broilers rearing, and biomass from school toilets, where the livelihoods in Rang'ara girls improved by retaining the poor girls in school due to money generated from the project.

6. FUTURE PLANS

To create a robust people-centered networking, mobilizing and empowering local disadvantaged girls and women living in remote areas of Kenya at their own proximity, giving them a voice and strength to fit in the 30% reserved government funds, as per the new constitution. Thika Technical Training Institute being the centre for generation of Artemisia seedlings has undertaken the duty to train the informal sector on Artemisial management and economics for better livelihood. The students in Agriculture Engineering have become more focused in their studies as they use most of their free time learning various aspects of Artemisia production.

ACKNOWLEDGEMENTS

We are grateful to Nicholas Bundi for his help in the editing of the manuscript and data analysis.

Principal, Rwika technical institute and staff

Principal, Thika technical institute

Principals, Mbeere, Embu and Kirinyaga counties

Rwika 'kio ni kindu' self help group

Mike Mmera of Elimu yetu foundation Kenya

Artemisial pioneer group in Western Kenya, Bondo University

Principal Rang'ara and Mukumu girls in Western Kenya

President of 1 Day organization Brazil

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