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Bio-Prospective Studies on Medicinal Plants Used to Manage Poultry Diseases in the Mount Elgon Region of Uganda

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Abstract: The need to utilise drugs and pesticides from local plants is increasingly becoming more important, not only because of the high cost of imported chemicals and drugs, but the availability of these imported drugs has become erratic as their importation has to compete for the meagre foreign exchange with other vital imports required for industrial and social development. In the mount Elgon region of Uganda, plants are often used for treatment of poultry infections. The most highly ranked were: *Kedrostis foetidisma (*Namusisi), *Tithonia diversifolia* (Nabululu), *Cannabis sativa*(Nzaye), *Jatropha carcus*(Lisanda), *Capsicum frutescens (*Pilipili), *Aloe* sp. (Kukatyakatya), *Kigelia africana* (Kifungu), *Albizia coriaria*(Kiluku) and *Oxygonum simatum* (Namakumba). Six methanol extracts showed antibacterial activity against *Staphylococcus aureus:Erythrina abysinicca, Tephrosia vogelii; Threehad activity against Pseudomonas aeruginosa: Cannabis sativa, Stephania abysinica, Albizia conari* and 12 had activity against *Bacillus subtilis: Cannabis sativa, Capsicum frutescens*, *Lantana camara*, *Jatropha carcus*, *Stephania abysinnica*, *Dracenea steudneri*, *Albizia conaria*, *Tephrosia vogelii*, *Aloe* sp., *Erythrina abysinicca*, *Oxygonum sinuatum*, *Azadirachta indica*; four methanol extracts had activity against E. coli: *Oxygonum sinuatum*, *Stephania abysinnica*, *Albizia conaria*, *Tephrosia vogelii*; 7 plants (methanol extracts) had no demonstrable antibacterial activity: *Mormodica foetida, Vernonia amygdalina, Cassia occidentalis, Ficus asperifolia, Spilanthes mauritiana, Agave sisalana, Cornyza sumatrensis.* Two plant extracts (methanol)were considered to have broad spectrumactivity: *Stephania abyssinica*, *Albizia coraria*. Of the petroleum etherextractsonly one plant showed activity against *Staphylococcus aureus*: *Erythrina abysinicca. One plant also had activity against Pseudomonas aeruginosa*: *Draceania steudner. For Bacillus subtilis 14 plants had activity*: *Capsicum frutescens*, *Ficus asperlifolia, Spilanthes mauritiana, Cassia occidentalis, Melia azaderach, Erythrina abysinica, Agave sisalana, Azadirachta indica Aloe* sp. *Kigelia africana Kedrosis foetidisma Tithonia diversifolia Aloe spp*, *Oxygonum sinuatum*; Only one plant (*Oxygonum sinuatum)* had activity against *E. coli.* Eight of the plants (pet–ether extracts) had no demonstrable antibacterial activity: *Cornyza sumatrensis*, *Moringa oleifera*, *Kigelia africana*, *Albizia conaria*, *Jatropha carcus*, *Lantana camara*, *Verninia amygdalina*, *Mormodica foetida. Erythrina abysinicca* (pet-ether extracts) had a broad spectrum of activity.

Key words: Medical plants, poultary diseases, methanol extracts, bio-prospective, Mount Elgon

INTRODUCTION

Since ancient times plants have been indispensable sources of both preventive and curative medicinal preparations for human beings and their domesticated animals. It is known that at least 121 chemical substances of known structure are still extracted from plants that are useful as drugs throughout the world . According to an estimate of the World Health Organization (WHO), approximately 80% of the people in developing countries rely chiefly on traditional medicines for their primary health care needs, of which a major portion involves the use of plant extracts or their active principles (Fransworth *et al*., 1985). Even in the United States, where synthetics dominate the drug market scene, plant products still represent an important source of prescription drugs. Approximately ¼ of all prescriptions dispensed from community pharmacies in the USA contain one or more ingredients derived from higher plants which in 1980 was valued at $8.112 billion (Fransworth and Soejarto, 1985).

Despite immense progress in modern medicine many rural people in Uganda still rely on plant-derived preparations for primary health care needs and those of

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their domesticated animals. Unfortunately, the local health traditions are being lost because they are oral and largely undocumented. Furthermore, because of deforestation and indiscriminate harvesting, some of the tree species are disappearing.

Here we report the results of studies designed to evaluate the antibacterial activity of selected plants that are used for the treatment of fowl diseases in the Mount Elgon area of Eastern Uganda. This was done in order to obtain a scientific basis for the promotion of herbal drugs in the treatment of poultry diseases. The herbal medicine could be more affordable than synthetic drugs and their use could improve poultry farming in the districts when adopted to supplement or even substitute for the expensive drugs currently used in the treatment of poultry infections. This will provide employment and increase money generation, thus reducing poverty and lead to better feeding and better human health.

MATERIALS AND METHODS

Field studies

Study areas and reconnaissance studies: This study was conducted in the Mt Elgon area of Uganda (Mbale). Preliminary reconnaissance studies were conducted in for the purpose of getting acquainted with the study areas, select counties, sub-counties and villages. A Participatory Rapid Appraisal (PRA) was used as the main method for gathering information from the identified user groups. The PRA techniques applied in the study included structured interviews and pair-wise ranking.

Laboratory investigations

Extraction procedures: Claim-evaluation studies were performed at the Department of Veterinary Physiological Sciences, Makerere University to validate some of the medicinal plants with reported value in the treatment of poultry diseases. This was performed using standard protocols and appropriate antimicrobial assay techniques adopted (Olila *et al*., 2002) to gain an insight into their potential as sources of novel antimicrobials.

Antibacterial assays: The antibacterial assays were done following procedures as reported before (Olila *et al*., 2002).

RESULTS AND DISCUSSION

In Mbale, 27 plant species werereported to be of use in poultry diseases. Table 1 gives medicinal plants and their uses.

Antibacterial activity of extracts of the medicinal plant extracts: Of the methanol extracts, 2 plants (*Erythrina abysinicca, Tephrosia vogelii*) *had* activity against *Staphylococcus aureus*; three had activityagainst *Pseudomonas aeruginosa* (*Cannabis sativa*, *Stephania abysinica*, *Albizia conaria*). The plants with activity against *Bacillus subtilis* were: *Cannabis sativa*, *Capsicum frutescens*, *Lantana camara*, *Jatropha carcusi Stephania abysinnica*, *Dracenea steudneri*, *Albizia conaria*, *Tephrosia vogelii*, *Aloe* sp., *Erythrina abysinicca*, *Oxygonum sinuatum*, *Azadirachta indica*. Fourplants hadactivity against *E. coli* (*Oxygonum sinuatum*, *Stephania abysinnica*, *Albizia conaria*, *Tephrosia vogelii*. A number of plants(methanol extracts) showed no demonstrable antibacterial activity (*Mormodica foetida*, *Vernonia amygdalina*, *Cassia occidentalis*, *Ficus asperifolia*, *Spilanthes mauritiana*, *Agave sisalana*, *Cornyza sumatrensis*). Two plants hadbroad spectrum of activity (*Stephania abyssinica*, *Albizia coraria* (Table 2).

In this study Albizia species had rather broad spectrum antibacterial activity. In other studies reported elsewhere, Albizia spp have been shown to have Low density Lipoprotein oxidising effects (Vaughn *et al*., 2007), antidepressant-like effects on mice (Kim *et al*., 2007) and antitumor effects (Liang *et al*., 2005).

A number of the petroleum ether extracts had antibacterial activity (Table 3). The only plant extract (pet-ether) that showed activity against *Staphylococcus aureus* was *Erythrina abysinicca.* Also, only one plant extract (*Draceania steudneri* against *Pseudomonas aeruginosa* Several of the plants had activity against *Bacillus subtilis*: *Capsicum frutescens*, *Ficus asperlifolia*, *Spilanthes mauritiana*, *Cassia occidentalis*, *Melia azaderach*, *Erythrina abysinica*, *Agave sisalana*, *Azadirachta indica Aloe* sp. *Kigelia africana Kedrosis foetidisma Tithonia diversifolia Aloe* sp., *Oxygonum sinuatum.* The only plant extract with activity against E. coli was *Oxygonum sinuatumi.* The petroleum ether extractswith no demonstrable antibacterial activity were the following: *Cornyza sumatrensis*, *Moringa oleifera*, *Kigelia africana*, *Albizia conaria*, *Jatropha carcus*, *Lantana camara*, *Verninia amygdalina*, *Mormodica foetida. Erythrina abysinicca* pet-ether extract had broad spectrum of activity (Table 4).

These results would suggest that some of the plants have a basis for use especially in management of bacterial infections of poultry.Some of the plants studied here have also been reportedly used in other parts of Africa. For instance *Azadirachta indica* has been reported in several studies as having insecticidal activity (Garica *et al*., 2006), antibacterial and antihemorrhagic

Table 1: Ethno botany and preparation the medicinal plants (Mbale)

Plant name (Botanical and local [Lugisu])	Habit	Part used	Preparation and administration
Kedrostis foetidssima (Namusisi)	Herb	Freshleaves	Crush add water, administer orally for cough.
Oxygonum simatum (Namakumba)	Herb	WPL	Crush in combination with *Kedrostis foetidsima* (Namusisi), add water. Administer orally for diarrhea (1 teaspoonful morning and afternoon until bird improves
Oxygonum simatum (Nabululu)	Herb	Seeds	Crush add water, administer orally for listlessness and general malaise
Cannabis sativa (Nzaye)	Shrub	Leaves	Crush in combination with "Nabululu", add water.Administer orally for cough.
Erythrina abyssinica (Kitugutu)	Tree	Stem	Crush add water. Administer orally or cough.
Jatropha carcus (L) (Lisanda)	Shrub	Sap	Apply onto eyes2 times/day for 3 days against mites, swollen eyes.
Capsicum frutescens (Pilipili)	Shrub	Fruits	Crush with WPL of Nasambu add water. Administer orally for worms
Aloe sp (Kukatyakatya)	Herb	Leaves	Squeeze out juice. Administer orally for NCD.
Agave sisalina (Makhoholi)	Herb	Leaves	Squeeze out juice.Administer orally for NCD (used in scarcity of Kukatyakatya).
Cannabis sativa (Nzaye)	Shrub	Leaves	Crush add water.Administer orally for cough, NCD.
Kigelia Africana (Kigungu)	Tree	Fruits	Crush add water.Administer orally for cough
Albizia coriaria (Kiluku)	Tree	Leaves, stem bark	Crush add water.Administer orally for cough
Stephania abyssinica (Namukaha)	Herb	WPL	Crush with leaves of Ilela and water. Administer orally.Sudden death. (2 drops morning and afternoon until bird improves.)
Oxygonum simatum (Namakumba)	Herb	WPL	Crush with WPL of Namusisi add water.Administer orally for diarrhea, cough
Lantana camara (L) (Solokho)	Shrub	Leaves	Crush with leaves *Spilanthes mauritiana* (Nadwasi add water. Administer orally for cough.
Cassia ocaidentalis (Namaseze)	Shrub	Leaves	Crush with leaves of *Spilanthes mauritiana* (Nadwasi) add water.Administer orally for cough and diarrhea.
Moringa oleifera (Lam) (Moringa)	Tree	Leaves	Crush add water.Administer orally for prophylaxis.
Dracaena steudneri (Iusiyopo)	Shrub	Leaves	Crush with leaves of Nzaye add water.Administer orally for cough and diarrhea.
Momordica foetida (Nashikokhokokhe)	Shrub	Leaves	Crush with leaves of kamabenubenu, add water. Administer for diarrhoea.
Melia azedarach (Ilela)	Tree	Leaves	Crush with leaves of Kukatyakatya, add water. Administer orally for listlessness.
Ficus asperifolia (Zisilegweti)	Shrub	Fruits	Extract juice apply onto eyes for mites.Applyuntil mites disappear.
Ficus asperifolia (Neem)	Tree	Leaves	Crush, add water. Administer orally for diarrhea and listlessness.
Banana	Tree	Peelings	Burn to ash (Gumusambizi) add water.
Paw paw	Tree	Stem, roots	Administer orally for cough
Bean plant	Herb	WPL	
Zingoyezegamaboti	Herb	Vines	Crush, add water. Administer orally for egg production.
Imbolabole (*banana)	Tree	Rotting pseudo stem	Extract juice. Administerorally for cough
Vernonia amygdalina (Lililuse)	Tree	Leaves	

NB:*Kedrostis foetidisma* (Namusisi), *Tithonia diversifolia*(Nabululu), *Cannabis sativa*(Nzaye), *Jatropha carcus*(Lisanda), *Capsicum frutescens* (Pilipili), *Aloe sp* (Kukatyakatya), *Kigelia africana* (Kifungu), *Albizia coriaria*(Kiluku), *Oxygonum simatum* (Namakumba) and (ash) Gumusambizi are the most commonly cited/used plants in the Mt Elgon region

Table 2: Agar-well diffusion assay results (methanol extracts)

Botanical name	*Staph. aureus*	*Pseudomonas aeruginosa*	*Bacillus subtilis*	*E.coli*
Momordica foetida	R	R	R	R
Cannabis sativa	R	S (30 mm)	S (29 mm)	R
Vernonia amygdalina	R	R	R	R
Cassia occidentalis	R	R	R	R
Lantana camara	R	R	S (13 mm)	R
Jatropha carcus	R	R	S (10 mm)	R
Capsicum frutescens	R	R	S (12 mm)	R
Ficus asperifolia	R	R	R	R
Stephania abyssinica	R	S (12 mm)	S (9 mm)	S 11mm
Dracaena steudneri	R	R	S (10 mm)	R
Spilanthes mauritiana	R	R	R	R
Albizia conaria	R	S (16 mm)	S (23 mm)	S10mm
Tephrosila vogellii	S(12 mm)	R	S (10 mm)	S (10 mm)
Agave sisalana	R	R	R	R
Cornyza sumatrensis	R	R	R	R
Azadirachta indica	R	R	S (11 mm)	R
Aloe sp.	R	R	S (11 mm)	R
Erythrina abyssinica	S (12 mm)	R	S (14 mm)	R
Oxygonum sinuatum	R	R	S (12 mm)	S (8 mm)
Kigelia Africana	R	R	S (19 mm)	R
Kedrostis foetidssima	R	R	S (14 mm)	R
Tithonia diversifolia	R	R	S (10 mm)	R
Moringa oleifera	R	R	R	R

Table 3: Agar-well diffusion assay results (petroleum ether extracts)

Botanical name	*Staph. aureus*	*Pseudomonas aeruginosa*	*Bacillus subtilis*	*E.coli*
Cannibis sativa	R	S 26 mm	S (40 mm)	R
Momordica foetida	R	R	R	R
Dracaena steudneri	R	S (8 mm)	R	R
Vernonia amygdalina	R	R	R	R
Lantana camara	R	R	R	R
Jatropha carcus	R	R	R	R
Capsicum frutescens	R	R	S (10 mm)	R
Albizia conaria	R	R	R	R
Ficus asperifolia	R	R	S (9mm)	R
Spilanthes mauritiana	R	R	S (11 mm)	R
Cassia occidentalis	R	R	S (9mm)	R
Melia azedarach	R	R	S (18 mm)	R
Kigelia Africana	R	R	R	R
Erythina abyssinica	R	R	S (8 mm)	R
Agave sisalana	R	R	S (10 mm)	R
Azadirachta indica	R	R	S (11 mm)	R
Aloe sp.	R	R	S (11 mm)	R
Azadirachta indica	R	R	S (14 mm)	R
Erythina abyssinica	S (12 mm)	R	S (14 mm)	R
Oxygonum sinuatum	R	R	S (12 mm)	S (8 mm)
Kigelia Africana	R	R	S (19 mm)	R
Tithonia diversifolia	R	R	R	R
Kedrostis foetidssima	R	R	S (14 mm)	R
Tithonia diversifolia	R	R	S (10 mm)	R
Moringa oleifera	R	R	R	R
Cornyza sumatrensis	R	R	R	R

Table 4: Summary of medicinal plants and bacteria that are sensitive to extracts

Family	Scientific name	Local name	Bacteria sensitive
Solanaceae	*Capsicum frutescens*	Pilipili	BS
Asteraceae (Compositae)	*Spilanthes mauritiana*	Nadwasi	-
Polygonaceae	*Oxygonum sinuatum*	Namakumba	BS, EC
Caesalpinaceae	*Cassia didymobotrya*	Kamabenubenu	-
Asteraceae (Compositae)	*Tithonia diversifolia*	Nabululu	BS
Menispermaceae	*Stephania abyssinica*	Namukaha	PA, BS, EC
Verbenaceae	*Lantana camara*	Solokho	BS
Meliaceae	*Melia azedarach*	Ilela	ND
Moraceae	*Ficus asperifolia*	Zisilegweti	BS
Aloaceae	*Aloe sp*	Kukatyakatya	BS
Cucurbitaceae	*Kedrostis foetidisma*	Namusisi	BS
Agaveaceae	*Agave sisalina*	Makhoholi	BS
Cannibiaceae	*Cannabis sativa*	Nzaye	PA, BS
Euphorbiaceae	*Jatropha carcus*	Lisanda	BS
Papilionaceae	*Erythrina abyssinica*	Kitugutu	SA, BS
Mimosaceae	*Albizia conaria*	Kiluku	BS, PA, EC
Moringaceae	*Moringa oleifera*	Moringa	-
Dracaenaceae	*Dracaena steudneri*	Iusiyopo	EC
Bignoniaceae	*Kigelia Africana*	Kifungu	-
Cucurbitaceae	*Momordica foetida*	Nashikhohekhohe	-
Melvaceae	*Azadirachta indica*	Neem	BS
Asteraceae (Compositae)	*Conyza sumatrensis*	Nasambu	-
Asteraceae (Compositae)	*Vernonia amygdalina*	Liluluse	-
Caesalpiniaceae	*Cassia occidentalis*	Namaseze	-

activity (Thakurta *et al*., 2007), immune enhancement (Mandal *et al*., 2007) and cardio-protective (Peer *et al*., 2007). *Erythrina abysinicca* would seem to hold some potential as an antimalarial (Yenesew *et al*., 2004, 2003).

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