

Research Application Summary

**Contribution of natural products in the management of livestock diseases**

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**Abstract**

Before the introduction of synthetic veterinary drugs (SDs), plants were used as the basis of traditional remedy for the management of livestock diseases in Africa. Despite the fact that most of the commercially SDs are effective, smallholder farmers especially those living in remote rural areas are not easily accessing them. They therefore rely on the use of indigenous plants which are known to be effective in the management of livestock diseases. The knowledge on the use of these plants have been well preserved in societies and verbally transmitted generations to generations. This paper is therefore presenting a review on plants of ethno veterinary relevance and bioactive compounds report there from.

Key words: Bioactive compounds, ethno veterinary, veterinary drugs

**Résumé**

Avant l'introduction de médicaments vétérinaires synthétiques (MSs), les plantes étaient utilisées comme base de remède traditionnel pour la gestion des maladies animales en Afrique. Malgré le fait que la plupart des MSs modernes sont efficaces, les petits agriculteurs en particulier ceux qui vivent dans les zones rurales reculées n'en ont pas accès facile. Ils dépendent donc de l'utilisation des plantes indigènes qui sont connues pour être efficace dans la gestion des maladies animales. Les connaissances sur l'utilisation de ces plantes ont été bien conservées dans la société et verbalement transmises de générations en générations. Ce document présente donc un examen sur les plantes de rapport de pertinence vétérinaire et les composés bioactifs ethno là depuis.

Mots clés: composés bioactifs, vétérinaires ethno, les médicaments vétérinaires

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**Background**

Plants have contributed a great deal in the development of drug leads that were eventually developed into drugs for the management of human diseases (Jasuja *et al.*, 2012). It therefore justifies the relevance of ethnomedical information that has been passed on from

generations to generation in many societies in the world. Unlike ethnomedical information which has contributed immensely in the development of clinically useful drugs, only a limited number of plants used for the management of livestock disease have been exploited for the same. Unlike synthetic veterinary drugs where some of them are posing some side effects to animals, plants which are traditionally used for the management of livestock diseases since time immemorial, are known to be compatible with other biological systems. The recently established resistance of livestock disease vectors and pathogens has provided the momentum for the need to discover new classes of veterinary drugs with unique mechanisms of actions. One of the best sources so far is nature which has never stopped supporting human, livestock as well as wild animals (Makkar *et al.*, 2009). Plants and compounds therefrom with veterinary relevance are discussed below.

## Method

Scientific papers published in the period of 2003 to 2015 which report compounds with insecticidal and anthelmintic activity were reviewed. The focus was also on compounds that either induce mortality or deter ticks and other insects of veterinary relevance. Papers were internet sourced.

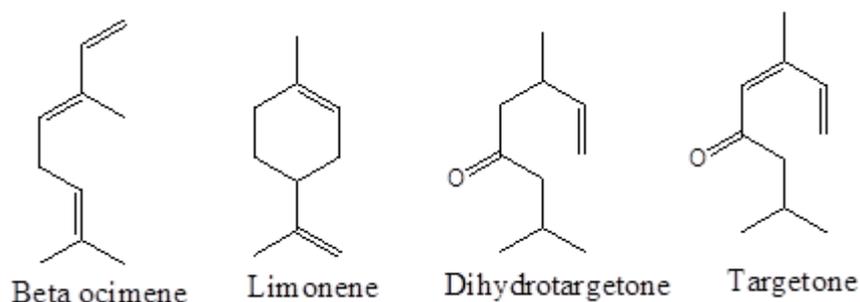
## Results

The use of plants for the management of livestock diseases is practiced not only in Africa but also in other parts of the world. For instance, *Tagetes minuta* which is an annual perennial herb native to temperate grassland and montane regions of South America, and an exotic species to Africa, Europe, Asia and Australia is used by communities from these countries for the management of ticks (Hulina, 2008; Ofori *et al.*, 2013). The acaricidal activity of this plant was established to be exerted by the essential oil. *Tagetes minuta* essential oil (TMEO) was found to induce acaricidal activity to both hard and soft ticks. Garcia and Coworkers (2012) reported that TMEO contains terpenes namely limonene (6.96%),  $\beta$ -ocimene (5.11%), dihydrotagetone (54.21%) and tagetone (6.73%).

*Terminalia arjuna* growing on river banks or near river beds in South and Central India was reported to exhibit anthelmintic activity against *Haemonchus contortus* and gastrointestinal trichostrongyle nematodes in sheep (Bachaya *et al.*, 2009). The anthelmintic activity was due to the presence of condensed tannin which may impair vital processes such as feeding and reproduction of the parasites or may bind and disrupt the integrity of the parasites' cuticle. However, the anthelmintic effect of tannin may be attributed to its ability to bind free protein available in the tubes for larva nutrition. This reduces the availability of nutrients which result in larva starvation or decrease in gastrointestinal metabolism through destruction of metabolic pathways of nutrient oxidation. This results in no release of energy which is in the form of ATP (Bachaya *et al.*, 2009).

A number of plants in Africa are also used for the management of livestock diseases. For instance, *Commiphora holtziana* has been utilized by rural pastoralist communities for repelling ticks and other harmful insects. This species is widely distributed in Kenya, Uganda,

Tanzania, Ethiopia, and Somalia. It secretes gum resin called 'gum haggard' which is rich in sesquiterpenes and furanosesquiterpenes (Birkett *et al.*, 2008). The resin from this plant was reported to exhibit repellency activity against cattle ticks (*Boophilus microplus*) and red poultry mite (*D. gallinae*) in chickens. The repellency was later established to be due to sesquiterpenes identified as gamma-elemene (16.69%), beta-bourbonene (20.83%) and germacrene-D (11.64%) (Birkett *et al.*, 2008). Most of the species in the genus *Commiphora* have also been reported to exhibit acaricidal and insecticidal activities. Other plant species exploited for the management of livestock diseases include *Maesa lanceolata*, *Myrsine africana*, *Rapaneamelan ophloeos*, *Embelia schimperi* and *Embelia keniensis*. They are used by many ethnic groups in Kenya for the treatment of intestinal worm in animals. Midiwo *et al.* (2003) validated this use and went further to establish the presence of benzoquinoid that reportedly exhibited nematicidal activity.



Compounds reported from *Tagetes minuta*

## Discussion

This review aimed at documenting the plants and their bioactive compounds responsible for treatment of veterinary diseases. The insecticidal and anthelmintic activity of these plants may be attributed to the presence of bioactive compounds in different morphological parts of the plants. The results of some research findings showed that the repellence activity of some plants was due to presence of essential oils but the composition varies according to the different parts of the plants and its stage of growth (Taylor *et al.*, 2011). Apart from insecticidal and anthelmintic activity of these plants, there are other research findings which showed that these plants can be used to treat different diseases in humans. The study done by Uzabakiriho *et al.* (2015) showed that *T. minuta* methanolic and water extract had high antibacterial activity against *Escherichia coli* and *Staphylococcus aureus* which cause disease to human.

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