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Perspectives for Ticks Control through Natural Products Use

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Abstract

This article approaches the problems regarding ticks worldwide and their current control perspectives through natural products.

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Ticks are ectoparasites that feed with host's blood and can easily adapt to hosts and the environment, accordingly with their species. Ticks can transmit various diseases, such as, *Borrelia burgdorferi* spirochete transmitted by *Ixodes ricinus* causing Lyme disease. This has effected humans with a large number of cases in the American continent and worldwide. Other species, in *Rhipicephalus* genus for example, can cause a large economic impact at the agricultural scenario, reducing productive and reproductive herd´s performance causing animal leader quality reduction, milk production loss, outstanding costs with the parasite control and possible pathogen transmission, such as protozoa from *Babesia* genus and rickettsia from *Anaplasma* genus. An infinity of other ticks' species can transmit various diseases for wild animals, and eventually domestic animals and humans.

Currently, ticks control is basically chemical control through synthetic molecules. However, this has provided a progressive increase at the number of ticks' resistance to main acaricides and consequently the necessity of increasing the acaricides frequency of use. On the other hand, this fact leads to three major problems: environmental contamination, fast development of germicide resistance and germicide residue at animal products (meat and milk) in farm animals case, which has preoccupied the society and government agencies worldwide. At this perspective, it´s important to prevent the use of synthetic chemical for acaricides and adopt ecologic friendly alternatives that cause less damage to the environment and can still control ticks. Plants are an important substance source with different chemical structure and various activities against arthropods, which promotes the development of new control practices researches, such as, the use of medicines based on plant extracts [1-4].

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Recent studies demonstrate acaricides activity on essential oil extract from plants. Essential oils are a mixture of volatile secondary metabolites extracted mostly from hydrodistillation of different plant parts, from leaves, fruit, seed to roots. It´s main chemical composition is terpenoids or isoprenoids, an over 40,000 substances family. A study with a Brazilian native plant essential oil *Baccharis dracunculifolia* DC (Asteraceae) (commonly "alecrim do campo") presented high acaricides activity (over 90%) in larvae and in adult females of *Rhipicephalus B. microplus.* Other studies performed with high tannins showed that their extract has larvicidal activity and also affect the reproduction of adult *R. microplus* females.

It has also been demonstrated that synthesized nanoparticles (NPs) are less prone to cause ecological damage and were identified as a substitute to chemical synthetic insecticide, so can be used for the vector control of diseases. A study has used aqueous extract of *Momordica charantia* Linn leaves (Cucurbitaceae), tropical areas plant (India, China, Japan, Oriental Africa and Souh America), for ZnO NPs production, used in blood parasites control, such as *R. microplus*, with excellent and eco-friendly results (Gandhi et al.). In South Africa it was performed a recent study using 13 plant species ethanolic and acetonic extracts for controlling blue-African tick *Rhipicephalus (Boophilus) decoloratus*, African and Asian common specie. Two species were very promising and their extracts killed 80% to 82% of the tested tick population.

The results discussed here, however, are not new but can be dated from the 90´s to present. They demonstrate various efficacies, accordantly the plant species, tested compost type and used concentrations. The tick genus broadly used at this type of experiments are *Rhipicephalus (Boophilus), Amblyomma, Dermacentor, Hyalomma* and *Argas*. Frequently, the main plant species belong to *Lamiaceae*, *Fabaceae*, *Asteraceae*, *Piperaceae, Verbenaceae* and *Poaceae* family. Different secondary metabolites present at vegetal extract are the best alternative to susceptive tick or commercial acaricides resistant control [5-7].

Indeed, the search for natural products, eco-friendly with low animal and human toxicity and low economic cost is increasing worldwide, with great perspective for its use to become a reality. After all, in a limited resources planet, large scale chemical contamination and increasing human population, choose to reduce environmental pollution and reduce the synthetic chemical products is a matter of survival.

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