



A Monthly e Magazine
ISSN:2583-2212
Nov, 2023 3(11),2963-2966

Popular Article

Herbals: An alternative approach to overcome anthelmintic resistance

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<https://doi.org/10.5281/zenodo.10210338>

Introduction

Helminths are a group of parasites which can affect the health of livestock population. Increase in development of resistance in these parasites is threatening the economics of a farmer along with the health and production from the animals. Till date for the control of helminth parasites we relied on the administration of pharmaceutical anthelmintic drugs, which contributes for the major part of expenditure on animal farms. For the past 50 years chemical method of controlling the infection in farm was very effective, eradicating nearly 95% of parasite infection, broad spectrum of helminths susceptibility, safety of margin and cost effective. Unfortunately, indiscriminate usage of these drugs more frequently or under dosage has led to an occurrence of anthelmintic resistance towards these parasites. Various parasitic worms include tapeworms, roundworms, lungworms, liver flukes, hook worms, whip worms etc. At present, the three major classes of anthelmintics widely used are the benzimidazoles, imidazothiazole and macrocyclic lactones.

The term resistance refers to the condition of a parasite population that was earlier susceptible to the anthelmintic drug, inherit the ability to resist and survive against the action of the drug even after repeated administration. If similar pattern of resistance is shown towards more than one class of drug it is termed as multi-drug resistance. Despite of the vast dependency on synthetic drug molecules for the control of parasitic infections, literature suggests that natural products derived from plants also have a reliable activity as an antiparasitic. The knowledge obtained from the branch of ethnoveterinary pharmacology is rooted and passed down from many generations.



Plants with anthelmintic activity

Plants such as *Ocimum sanctum* chemically contains Carvacrol, Caryophyllene, Eugenol, Linalool, Urosolic acid is effective against round worm, *Caenorhabditis elegans* cause paralysis of the infected worm. *Artemisia annua* plant extract and methanolic extract of *Punica granatum* were found effective against *Haemonchus contortus*, a barbers pole worm which is a common infectious nematode in ruminants at LC₉₉ 1.27 µg/mL in egg hatch test assay, and in the larval development test assay, showed LC₉₉ at 23.8 µg/mL. Ethanolic extract of 5% *Nigella sativa* inhibited motility of paramphistome, *Cotylophoron cotylophorum* which is known to cause parasitic gastroenteritis in small ruminants. *Asparagus racemosus*, *A. officinalis* contains racemosol, asparagamine, folic acid, *Withania somnifera* (Ashwagandha) and *Mentha cordifolia* (mentha) can cause paralysis of the worm and death. Cinnamon obtained from the plant *Cinnamomum zylanicum*, *Coriandrum sativum* contains (linalool, linoleic acid, camphor, geraniol, coumarins) and *Annona* from *Annona squamosa* showed the ability to inhibit egg hatching ability and larval motility. *Catharanthus roseus* contains vincristine, vinblastine and catharanthine prevented the polymerization of tubulin into microtubules in the parasites. Azadirachtin, an alkaloid occur in the plant *A. indica* has distinct anthelmintic activity against the strongyle infection in bovine, it promotes the expulsion of the worm by interfering with excitatory cholinergic transmission and partial blockade of calcium channel.

Essential oils obtained from trees have a marked odour are a mixture of volatile and lipophilic secondary metabolites. They are chemically composed of terpenoids and phenylpropanoids. Essential oils obtained from *Citrus limonia* leaves, *C. reticulata* fruit peels, *Foeniculum vulgare* exhibited schistosomicidal activity. Seeds of *Thymus vulgaris*, commonly called as thyme or ajwain was effective against *Haemonchus contortus*. Lemon grass oil obtained from *Cymbopogon citratus* exhibited anthelmintic activity against *Fasciola gigantica*, a bile duct fluke commonly found in sheep and cattle.

Conclusion

Literature suggests that many of the plants have activity against the helminthic parasites, which can used as an alternate to the chemical based anthelmintic drugs. Plants have a many more beneficial properties, relatively safe and economical. However, lot of research must be carried out to explore the molecular mechanisms of action of these plants.

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