Mobilizing tropical plants as a sustainable alternative to the issue of anthelmintic resistance in small ruminants

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Abstract

In Guadeloupe (FWI) breeders of small ruminants have to face with gastro-intestinal nematode (GIN) resistance against synthetic anthelmintics, a worldwide problem which led to high production losses. The INRA URZ specific integrated method for humid tropics to control GINs, includes the use of anthelmintic plants. At least 71 plants were found to be available in Guadeloupe to treat worms in animals. Among these plants, some contain condensed tannins (CT) that are bio-reactive complex plant secondary metabolites. Protein-CT interaction could result in affection of ruminal fermentation, allow availability of amino-acids and induce a gastrointestinal nematicidal action in ruminants.

A preliminary study was conducted in order to evaluate *in vitro* the effect of several CT types, against various chemical-resistant strains of the parasite *Haemonchus contortus*. CT from 8 plant species from 6 botanical families, were first extracted using acetone/water (3:7; v/v) and analyzed by LC-MS for CT content, polymerisation degree, procyanidin/prodelphinidin and free flavanol determination. CT extracts were assayed *in* vitro for their bioactivity against the larval exsheathment of the infective L3 stage of 5 various chemical-resistant strains of the parasite *Haemonchus* contortus, using up to 5 concentrations and 3 repetitions with Phosphate Buffer Sample (PBS) as control.

The results indicate that CTs can be used to control anthelmintic resistant parasites (EC50 from 1.36E-6 to 1mg.mL-1), but with varying efficiencies (9 to 100% efficacy) and decreasing with the multi-resistance of the strain (- 44% efficiency between the most resistant strain and the most sensitive to CT). This variability may be related to the structural complexity of the condensed tannins, the presence of other active compounds in the plant extracts, but also to the nature of the parasite resistance, which could affect the tannin-protein interactions.

Keywords : Condensed tannins, Gastrointestinal nematode, *Haemonchus contortus*, Anthelmintic resistance.