

## Developing novel anthelmintics from natural plant resources

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Gastrointestinal nematodes are important pathogens that cause widespread disease in humans and in domestic livestock. Many of these parasites have now acquired resistance to the three classes of anthelmintics used for control and resistance has spread world-wide. Currently, no alternatives are available commercially, making agriculture based on livestock, notably on sheep, difficult and even impossible in some parts of the world.

Naturally occurring plant products, have generally not lived up to initial expectations, but one class of plant-derived substances that have proven anthelmintic activity are the cysteine proteinases that occur in the latex and juices of plants such as papaya, figs, pineapple and kiwi fruits. We have assessed the activity of both the raw extracts from these fruits and of the purified enzymes they contain against the intestinal nematodes of mice, exploiting species of worms that have parallels in livestock. Our data show that that these enzymes destroy nematodes by attacking the cuticle, and that they are extremely effective at expelling worms from the stomach, small and large intestines. Hence, anthelmintic activity in this case is mediated by a mechanism that is totally different from that of any other known anti-parasitic drug. They show high efficacy against all the nematodes tested both in vitro and in vivo, and are safe with no evident side-effects. We believe that there is scope here to develop a potent new class of commercially viable anthelmintics for use in intensively farmed animals, and also to exploit the raw materials as a cheap and readily available remedy for worms for use by small holder farmers in Developing Countries.



C.2673