In vitro antiprotozoal action of 7 spices, medicinal plants and essential oils against 3 stages of Eimeria tenella

Claire Girard, Anne Silvestre, Thibaut Chabrillat, Sylvain Kerros

To cite this version:

Claire Girard, Anne Silvestre, Thibaut Chabrillat, Sylvain Kerros. In vitro antiprotozoal action of 7 spices, medicinal plants and essential oils against 3 stages of Eimeria tenella. World’s Poultry Congress (WPC), 2021, Online, France. hal-04126107

HAL Id: hal-04126107

https://hal.inrae.fr/hal-04126107

Submitted on 13 Jun 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License
**MATERIAL AND METHODS**

- **Natural products tested:**
  - MedP: Fabacea powder, Urticaceae extract, Punicaceae extract, Acanthaceae extract
  - EO: Lilaceae EO, Lamiaceae EO, Lauraceae EO
  - Negative control: H2O, soybean hemicellulose, DMSO
- **Protozoal strain:** *Eimeria tenella* recombined strain
- **3 experimental steps after cytotoxicity assay (colorimetric MTS test, 1.5×10⁴ MDBK seed, incubation 5h at 37°C):**
  1. Direct anti-protozoite activity test: incubation 41°C for 1h. Killed sporozoites were stained with Evans Blue Dye. Each sample tested in triplicate. Viability rate with fluorescence microscopy as % viability = number of live parasite in tested sample/ number of live parasite in negative control x 100
  2. Invasion inhibition test: 96 microplates: 1.5×10⁴ MDBK cells, 1.5×10⁴ *E. tenella* sporozoites expressed enzymatic activity; substrate added for 2h at 37°C, 4 replicates per tested sample. % invasion = absorbance (550 nm) tested sample/ absorbance (550 nm) negative control x 100
  3. Sporulation rate test: 5.10⁵ non-sporulated oocysts (in 2% potassium dichromate solution), incubation for 72h at 26°C; each sample tested in triplicate. % sporulation = number of sporulated oocysts in tested sample/number of sporulated oocyst in negative control x 100
- **Statistical test:** Mann-whitney test compared to negative control for each test (p<0.05).

**RESULTS AND DISCUSSION**

The 4 MedP samples (Fabacea powder, Urticaceae extract, Punicaceae extract, Acanthaceae extract) were less cytotoxic (lethal dose 10% (LD10) than the 3 EO samples (Lilaceae EO, Lamiaceae EO, Lauraceae EO) (MedP diluted at 10⁻², EO diluted at 10⁻⁴-10⁻⁶).

**DIRECT ANTI-PROTOZOAL ACTIVITY AGAINST E. TENELLA SPOROZOITES** (*: p<0.05; **: p<0.01; ***: p<0.001)

MedP samples showed direct anti-protozoal activity against *E. tenella* stages: sporozoite viability rates were between 76.2% and 27% (p<0.05). Lilaceae EO and Lauraceae EO exhibited 81% and 77% (p<0.05) sporozoite viability rates, respectively (Fig. 1).

**MDBK CELL INVASION BY E. TENELLA** (*: p<0.05; **: p<0.01; ***: p<0.001)

Punicaceae extract showed a reduction of 32% of cell invasion.

**SPORULATION INHIBITION OF E. TENELLA** (*: p<0.05; **: p<0.01; ***: p<0.001)

Acanthaceae extract and Urticaceae extract showed a sporulation inhibition of *E. tenella* oocysts (p=0.05) (Fig. 3).

**CONCLUSION**

Medicinal plant extracts exhibited an anti-protozoal activity against the different *E. tenella* stages. EOs only target sporozoites in this study. These findings help to understand how plant bio-actives could act to reduce *E. tenella* pathogenicity. Further studies could be carried out to test in vitro and/or in vivo potential synergies between different natural compounds.

**REFERENCE**