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Polyphenolic extract from olive mill waste waters (OMWW) inhibit *in vitro* ruminale methanogenesis of vetch-oat hay

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The olive fruit is very rich in phenolic compounds, but only 2% of the total phenolic content of olive fruit passes in the oil during pressing process, while the remaining amount is lost in the OMWW. The biological activities of these phenolic compounds, considered toxic and anti-environment agents, have been extensively illustrated and have shown a spectrum of highly interesting bioactivities. Otherwise, livestock contribute annually to 18% of Green House Gases emissions and that 37% of methane, with higher warming potential (23 times) relative to carbon dioxide, comes from microbial fermentation occurred in the rumen. In this optic, the present study aimed to evaluate the impact of the phenolic compounds of OMWW extracted from three locale varieties (*chemlal*, *Azzeradjand sigoise*) and obtained from two different process *in vitro* ruminale methanogenesis. Firstly, the phenolic content (total phenols, condensed tannins and flavonoids) has been determined. The impact of crude phenolic extract has been tested in batch systems in presence of ovine ruminale microbiota. Phenolic content of OMWW was statistically comparable between the two different processes (press and three phase extraction) (P=0.206). For both process, total phenols concentration was higher in sigoise (26.3 g/l) and lower in chemlal (20.1 g/l). At same, the flavonoids content of OMWW was similar between the three varieties (P=0.13). However, condensed tannins concentration was different in OMWW of the three varieties (P=0.0001). The higher content was observed for sigoise (5.29 g/l) and the lowest was noted for chemlal (3.93 g/l). Addition of phenolic extract obtained from the three varieties stimulates *in vitro* gas production for all incubation time. This increase in gas production was only significantly different for 48h of incubation (P=0.02). There appears to be adaptation of ruminale microbiota to phenolic compounds present in OMWW and/or these microorganisms dispose of enzymes for degrading these moieties. On the contrary, inclusion of phenolic extract in the culture media inhibits methane production. After 24 of incubation, methane production decrease by 12.3, 45.6 and 48.4% for sigoise, azzeradj and chemlal pressed traditionally. A different trend was noted for three phase process for which the reduction level was 33.1, 11.7 and 2.3% for azzeradj, chemlal and sigoise, respectively. This result was corroborated to protozoa count. In fact and for the two mode of extraction, a reduction in ciliate protozoa was recorded. For the press extraction, the higher diminution was observed for chemlal (24.3%) and the lowest for sigoise (2.56%). For the three phase process, this reduction was higher for azzeradj (9.61%) and the lowest for sigoise (2.56%). Addition of phenolic extract causes also a decrease in rumen ammonia concentration. This diminution is comprised between 7.1 and 27.8% for press process and 16.6 and 57.4% for three phase process. This situation could be explained by the disappearance of protozoa which assure in the rumen a high proteolytic activity. This work shows that phenolic extract of OMWW have the potential to be exploited in reduction of ruminale methane production. This activity seems to result in a reduction of ruminale fauna.

Biography

R Arhab is the Vice-Dean in charge of post-graduation and scientific research (since 2013) in Department of Natural Sciences and Life Sciences Faculty of Exact and Natural Sciences and Life, University Larbi Ben Mhidi, Algeria. He did his PhD on Biochemistry and Applied Microbiology. He is a reviewer in several journals: Animal Feed Science and Technology, Annual Research and Biology, Science and Technology and European Journal of Medicinal Plants, board member of the Arab League of medicinal and aromatic plants, head of a research project (from January 1, 2014). He was the member of the University Scientific Council (2002-2007), Chairman of the University Scientific Council (2009-2012), President of the University Scientific Committee (from 2012). He published more than 16 international research papers and 85 communications.

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