**Structural features of condensed tannins influence their antimethanogenic potential in forage plants**

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**Introduction**

- **Tannin rich forages (TRFs)** can enhance animal health and productivity and are hypothesized to decrease methane emissions (Mueller-Harvey et al. 2006)
- However, implications of TRFs on ruminants are not well understood due to high variability across studies.
- **Large structural diversity of tannins** could impact on ruminant nutrition as tannin structural features are rarely analyzed (Verma et al. 2021).
- **For condensed tannins (CTs)** syn. proanthocyanidins, polymer size (mean degree of polymerisation, mDP) and prodelphindin percentage (PD%) affect the bioactivity (Zeller et al. 2019)
- **Objectives**
  - Investigate variation in polyphenol and CT content as well as CT structural features across forage species.
  - Evaluate antimethanogenic potential of forages based on CT concentration and structural features.
  - Separate tannin from forage quality effect using tannin binding polyethylene glycol (PEG)

**Materials & Methods**

- **Greenhouse experiment with 6 species**
- Plants harvested at the flowering stage
- Leaf extracts analysed with UPLC-MS/MS Analysis
- Leaf samples (with and without PEG) analysed for methane and gas production with Hohenheim gas test

**Results**

- **CT concentration** (0-2.6 %, P<0.05), mDP (0 - 25, P<0.05) and PD% (0-91 %, P<0.05) in the forages varied significantly with the species.
- **CT concentration** (R= -0.79, P<0.0001), mDP (R= -0.57, P<0.0001), and PD% (R = -0.6, P<0.0001) were found to be negatively correlated to methane production.
- A concomitant reduction in gas and methane production was observed from TRFs
- **PEG-treatment** significantly increased gas and methane production from TRFs → reduction in the absence of PEG is a direct result of CTs.

**Conclusion**

- **Methane reduction** varied largely across forage species
- **Plantain** reduced methane without reducing gas production
- **CT structural features** play an important role in determining methane abatement potential of TRFs.

**References**

- Verma, S., F. Taube, and C.S. Malisch, Examining the variables leading to apparent incongruity between antimethanogenic potential of tannins and their observed effects in ruminants—A review. Sustainability. 2021.

**Acknowledgements**: The investigation was funded by Deutsche Forschungsgemeinschaft (DFG)

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