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Occurrence of linoleic acid and α-linolenic acid in tropical plants and their disappearance when incubated in buffered rumen fluid *in vitro*

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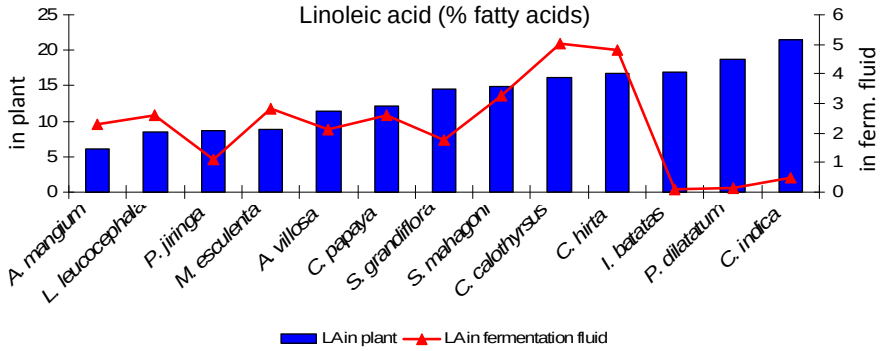
Introduction

- Feeding forages rich in polyunsaturated fatty acids (PUFA) is the first step towards increased PUFA contents in animal-source foods.
- The next step is determined by the extent of PUFA modification by ruminal microbes through biohydrogenation.
- A screening was conducted for the contents and ruminal disappearance of two major PUFA, i.e. linoleic acid (LA) and α-linolenic acid (ALA) in tropical forage plants.

Materials and Methods

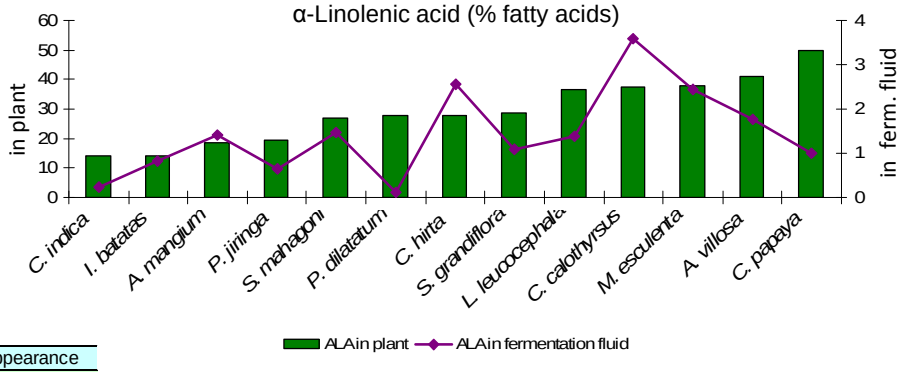
- Leaves from 27 tropical plant species were obtained from the area of Bogor, Indonesia.
- The plants were analysed for their chemical composition, including LA and ALA contents.
- Approximately 200 mg DM of each plant was incubated in duplicate *in vitro* with 30 ml rumen fluid/buffer mixture (1:2; v/v) for 24 h at 39°C using the Hohenheim Gas Test apparatus.
- After incubation, the fermentation fluid was analysed for the fatty acid composition using transesterification and subsequent gas chromatography.
- Disappearance of fatty acid was defined as the proportionate decline of the individual fatty acid in the lipids from feed to fermentation fluid.



Results

Proportion of linoleic acid (LA) in tropical plants and in fermentation fluid after 24 h incubation period.

Proportion of α-linolenic acid (ALA) in tropical plants and in fermentation fluid after 24 h incubation period.



Total phenolic contents of tropical plants and relative disappearances of linoleic acid (LA) and α-linolenic acid (ALA) from the plants into fermentation fluid.

Plant	Total phenolic (g/kg DM)	% Disappearance	
		LA	ALA
Acacia mangium	105	62	92
Acacia villosa	236	81	96
Calliandra calothyrsus	127	69	90
Clidemia hirta	216	71	91
Canna indica	14	98	98
Carica papaya	25	79	98
Ipomoea batatas	29	99	94
Leucaena leucocephala	96	69	96
Manihot esculenta	32	68	94
Paspalum dilatatum	25	99	99
Pithecellobium jiringa	193	87	97
Sesbania grandiflora	19	88	96
Swietenia mahagoni	207	78	95

Conclusions

- *Calliandra calothyrsus* and *Clidemia hirta* resulted in the highest LA and ALA in the fermentation fluid.
- High phenolic contents in *C. calothyrsus* and *C. hirta* might play a role in such a response. However, this can not be generalized for all plants.
- Plants possessing high contents of LA and/or ALA do not necessarily lead to high PUFA in the fermentation fluid due to a different intensity of biohydrogenation under rumen environment.

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