



HAL
open science

Dynamic of 16 fodder trees' nutritive values from June to October

Geoffrey Mesbahi, Philippe Barre, Rémy Delagarde, Fabien Bourgoïn, Romain Perceau, Sandra Novak

► To cite this version:

Geoffrey Mesbahi, Philippe Barre, Rémy Delagarde, Fabien Bourgoïn, Romain Perceau, et al.. Dynamic of 16 fodder trees' nutritive values from June to October. 6th European Agroforestry Conference. EURAF2022, Agroforestry for the Green Deal transition. Research and innovation towards the sustainable development of agriculture and forestry, May 2022, Nuoro, Italy. pp.340-342. hal-03683783

HAL Id: hal-03683783

<https://hal.inrae.fr/hal-03683783>

Submitted on 2 Jun 2022

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.

Title: Dynamic of 16 fodder trees' nutritive values from June to October

Agroforestry for the Green Deal transition. Research and innovation towards the sustainable development of agriculture and forestry

EURAF 2022
Agroforestry for the Green Deal transition. Research and innovation towards the sustainable development of agriculture and forestry
Abstract

Corresponding Author:
email

geoffrey.mesbahi@gmail.com
geoffrey.mesbahi@inrae.fr

Geoffrey Mesbahi¹, Philippe Barre², Rémy Delagarde³, Fabien Bourgoïn¹, Romain Perceau¹, Sandra Novak¹

¹ INRAE, FERLUS, 86600, Lusignan, France

² INRAE, URP3F, 86600, Lusignan, France

³ PEGASE, INRAE, Institut Agro, 35590 Saint-Gilles, France

Topic: Quality, safety and sustainability of agroforestry productions (processes and products)

Subtopic: Livestock productions

Keywords: livestock production, feeding value, crude protein, temperate region

Type of presentation (oral or poster): Oral

Abstract

Trees could help to reduce livestock production vulnerability to climate change by providing a fodder resource during periods of drought. Fodder trees are commonly used in tropical and Mediterranean areas, but they remain poorly studied in temperate regions. Previous studies highlighted that leaves of some tree fodder species have nutritive values close to those of herbaceous forages in summer (e.g. Mahieu et al. 2021). However, little is known about the variation in nutritive value of fodder trees throughout their growing period, from early summer to autumn.

This study focused on 16 tree species sampled in June, August and October, from 2014 to 2017, in 22 French locations (*Acer pseudoplatanus*, *Alnus cordata*, *Castanea sativa*, *Corylus avellana*, *Fagus sylvatica*, *Fraxinus americana*, *Fraxinus excelsior*, *Gleditsia triacanthos*, *Juglans x intermedia*, *Morus alba*, *Paulownia tomentosa*, *Prunus avium*, *Robinia pseudoacacia*, *Sorbus domestica*, *Ulmus minor*, *Ulmus* 'Nanguen'; n = 292). Leaf samples were analysed to determine their *in vitro* dry matter digestibility (IVDMD) and their contents in dry matter (DM), ash, crude protein (CP), neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (ADL). The seasonal variation of these variables was analysed using a linear mixed model and estimated marginal means. Sampling location and year were used as random factors.

Our results highlighted divergent seasonal dynamics depending on the nutritive values (Figure 1). Only leaf CP decreased from June to August and from August to October ($P \leq 0.001$). DM, ash content and IVDMD decreased from June to August ($P \leq 0.001$), but had weak evidence to evolve from August to October ($P > 0.05$). We found no evidence of seasonal variation for NDF, ADF and ADL ($P > 0.1$). The dynamics of IVDMD, CP, NDF, ADF and ADL were similar of those observed by Vandermeulen et al. (2018), who focused on different temperate tree species.

Castanea sativa was the only species to strongly improve CP (from 140 g/kg in June to 172 g/kg in August). *Robinia pseudoacacia* increased NDF, ADF and ADL from June to August and *Fraxinus americana* decreased mineral content from August to October, while other species mainly remained constant. *Robinia pseudoacacia* behaviour was similar to the results of Papachristou et al. (1999), but few studies focused on the seasonal variability of the studied species. However, the effects of species could be higher than those of season, as previously showed (Wood et al. 1994; Ravetto Enri et al. 2020).

Our results as well as bibliography references highlighted specific dynamics between the different components of the nutritive value, as well as diversity among species in the seasonal variability. More studies are now required to better characterise the variation in nutritive value of tree fodder species across seasons, their biomass production and palatability.

We warmly thank Charlène Barotin, Gaëlle Rochas, Maryline Vandier, Nathalie Moynet and Véronique Menanteau for biochemical analyses. This study was funded by the European Union (AGFORWARD FP7), ADEME (PARASOL), French Ministry of Agriculture and Food (Casdar Arbele) and Fondation de France (Patura3D).

Mahieu S, Novak S, Barre P, et al (2021) Diversity in the chemical composition and digestibility of leaves from fifty woody species in temperate areas. *Agroforest Syst* 95:1295–1308.

<https://doi.org/10.1007/s10457-021-00662-2>

Papachristou TG, Platis PD, Papanastasis VP, Tsiouvaras CN (1999) Use of deciduous woody species as a diet supplement for goats grazing Mediterranean shrublands during the dry season. *Anim Feed Sci Technol* 80:267–279. [https://doi.org/10.1016/S0377-8401\(99\)00056-5](https://doi.org/10.1016/S0377-8401(99)00056-5)

Ravetto Enri S, Probo M, Renna M, et al (2020) Temporal variations in leaf traits, chemical composition and in vitro true digestibility of four temperate fodder tree species. *Anim Prod Sci* 60:643.

<https://doi.org/10.1071/AN18771>

Vandermeulen S, Ramírez-Restrepo CA, Marche C, et al (2018) Behaviour and browse species selectivity of heifers grazing in a temperate silvopastoral system. *Agroforest Syst* 92:705–716.

<https://doi.org/10.1007/s10457-016-0041-x>

Wood CD, Tiwari BN, Plumb VE, et al (1994) Interspecies differences and variability with time of protein precipitation activity of extractable tannins, crude protein, ash, and dry matter content of leaves from 13 species of Nepalese fodder trees. *J Chem Ecol* 20:3149–3162. <https://doi.org/10.1007/BF02033717>

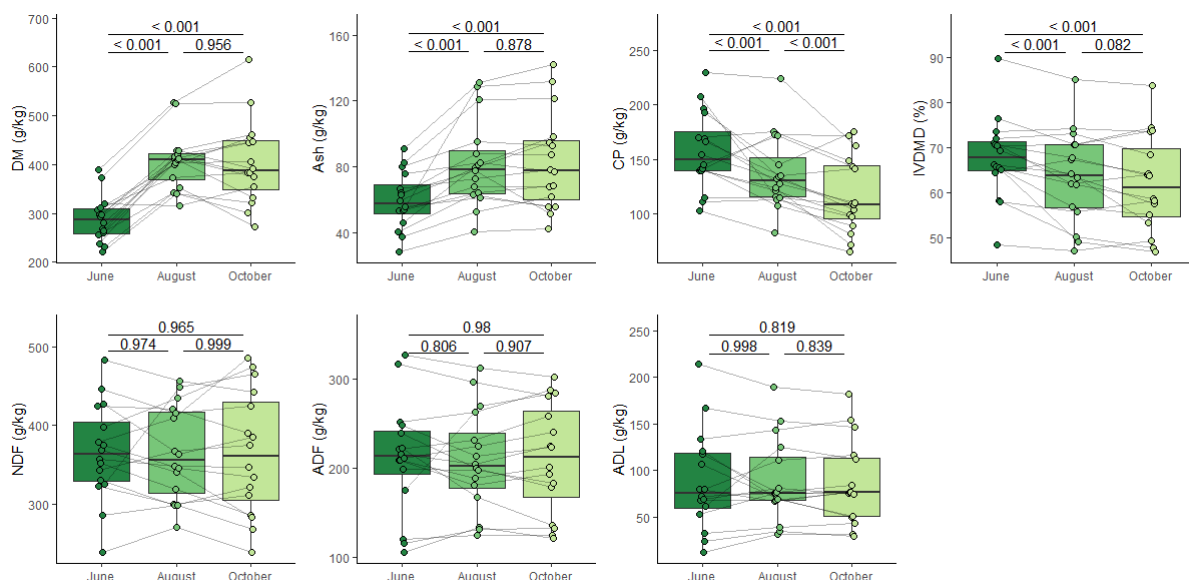


Figure 1. Chemical composition (g/kg) and IVDMD (%) of the leaves of 16 tree species across seasons. P-values evaluate seasonal effect on nutritive values. Dots represent monthly mean values of the 16 studied species.