



Flemingia macrophylla, a tropical shrub legume for dry season supplementation

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The species

- *Flemingia macrophylla* (Willd.) Kuntze ex Merr., synonyms *F. congesta*, *Moghania congesta*
- Perennial, leafy legume shrub for the humid and subhumid tropics
- Native to Southeast Asia; naturalized in West Africa and tropical America
- Multipurpose legume, used as soil cover, erosion barrier hedge, mulch and firewood in low-input smallholder production systems
- Outstanding features: wide range of soil adaptation, including acid, low-fertility soils; good drought tolerance; excellent regrowth after cutting
- Forage potential of widely used accessions limited in terms of digestibility due to high tannin content combined with low palatability to cattle

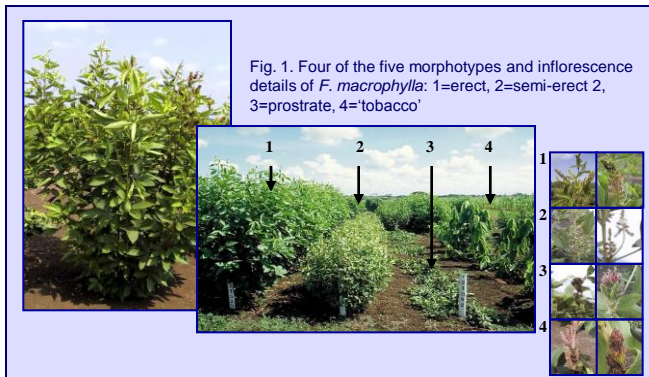


Fig. 1. Four of the five morphotypes and inflorescence details of *F. macrophylla*: 1=erect, 2=semi-erect 2, 3=prostrate, 4='tobacco'

Objectives of the study

- Describe variability in *F. macrophylla* collection with particular consideration of especially important plant characteristics related to feed quality (digestibility, dry matter production, crude protein, fiber and tannin contents)
- Identify accessions with promising agronomic potential superior to control accession CIAT 17403

Materials and methods

- **Evaluation site:** Quilichao experimental station of Centro Internacional de Agricultura Tropical (CIAT), Cauca Department, Colombia; space-planted, single-row plots, random complete-block design with three replicates; collection comprising 74 accessions
- **Soil characteristics:** Acid Ultisol (pH 5.3), 76% Al saturation, medium P (6 ppm Bray-II) and high organic matter content (7.4%)
- **Agronomic and morphological evaluation:** Parameters measured during two subsequent years: vigor, height, diameter, regrowth after cutting, incidence of diseases, pests and nutrient deficiencies, dry matter (DM) production during wet and dry seasons
- **Nutritive value analysis:** Crude protein (CP) content and *in vitro* dry matter digestibility (IVDMD) of the entire collection; fiber (ADF, NDF, N-ADF), acetone-extractable and bound condensed tannins (ECT, BCT), astringency (protein-binding capacity), proanthocyanidin composition (D:C:P) in subset of 25 accessions; additionally subset of 10 high-quality accessions (including control) after 4, 6 and 8 weeks of regrowth in order to investigate effect of age on the above parameters

Results

- **Entire collection:**
 - 5 morphotypes identified: erect, semi-erect 1+2, prostrate, tobacco (Fig.1)
 - IVDMD 28-58%, CP 13-25%, mean DM production 2.08 t/ha in rainy and 1.18 t/ha in dry season; no season x genotype interaction except for DM production in semi-erect 2 morphotype
 - 3 accessions (semi-erect 1) superior to control with IVDMD up to 54% and DM production up to 5.2 t/ha identified (Tab.1)
- **Representative 25-accession subset:** NDF 29.5-39.8%, ADF 17.0-29.2%, N-ADF 6.6-16.9%, ECT 0-19.4%, BCT 1.3-3.3%, astringency 1.7-6.8%. **Correlations ($P < 0.01$):** ADF/NDF: $r_{rainy} = 0.549$, $r_{dry} = 0.645$; IVDMD/ECT: $r_{rainy} = -0.694$, $r_{dry} = -0.576$; ECT/astringency: $r_{rainy} = 0.712$, $r_{dry} = 0.721$; IVDMD/astringency: $r_{rainy} = -0.632$, $r_{dry} = -0.548$; D:C:P ratio (s. Fig. 2)
- **Subset of 10 accessions:** Forage quality varied with time, patterns different in rainy and dry season for both averaged values of the 10 accessions and individual accessions; correlations between NDF/ADF, and IVDMD/ECT/astringency.

Tab. 1. DM production and nutritive value of selected promising accessions (averages from two 8-week regrowth cuts)

Accession number	DM prod (t/ha)		IVDMD (%)		CP (%)		ECT (%)	
	Rainy	Dry	Rainy	Dry	Rainy	Dry	Rainy	Dry
18437	2.39	1.59	51	45	22	21	4.24	7.56
21083	3.17	1.45	49	51	23	18	0.11	0.00
21090	5.20	2.01	54	47	23	18	ND	ND
17403 (Control)	2.62	1.53	41	36	21	23	4.32	9.62

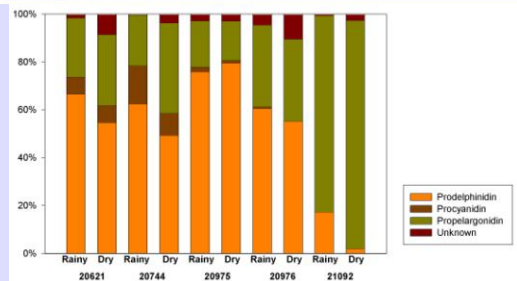


Fig. 2. Propdelphinidin-procyanidin-propelargonidin (D:C:P) percentage in extractable condensed tannin samples of five *F. macrophylla* accessions in rainy and dry season

Conclusions and Recommendations

Agronomic characteristics and forage quality of *F. macrophylla* varied greatly among 74 accessions as well as between seasons. Materials differed greatly in IVDMD, DM production, ECT, tannin extractability (ECT/total CT), astringency and D:C:P ratios whereas CP and BCT showed only minor variability. IVDMD was negatively correlated with ECT and astringency.

Seasons had a pronounced effect on IVDMD, DM production, plant height and diameter (higher in the rainy than in the dry season). No genotype x season interactions were detected.

F. macrophylla accessions CIAT 18473, 21080 and 21090 with IVDMD up to 54% were identified for further testing as promising for dry season supplementation. However, their low seed production under the experiment conditions requires further research.

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