Physicochemical characterization of three bamboo species: *Dendrocalamus asper*, *Bambusa tuldooides* and *Bambusa vulgaris*, available in Unicamp

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Abstract

Young bamboo culm is a resource that could be more utilized, because sustainable exploration of clump is only possible if matured shoots and culms are taken. This study aimed to obtain and to characterize young bamboo culm flour of species *Dendrocalamus asper*, *Bambusa tuldooides* and *Bambusa vulgaris* for future food applications. Young culm were picked, cut in three parts ("bottom", "middle" and "top"), processed into flour and analyzed physicochemically. Data were obtained in triplicates and availed by difference among the parts of bamboo culm, by variance analysis (ANOVA) and Scott-Knott Test ($p < 0.05$). It were observed protein, ash and lipid contents lower than 3g/100g, starch content between 1,84 and 17,75 g/100g, and fiber content between 64,36 and 93,51 g/100g. Additionally, it was found potential to fiber (*D. asper* and *B. tuldooides*) and starch (*B. vulgaris*) extraction.

Key words: bamboo, sustainability, dietary fiber.

Introduction

Brazil has 89% of all bamboo genus and 65% of all species known in America, and the most broadcasted are *Dendrocalamus asper*, *Bambusa tuldooides* e *Bambusa vulgaris*^{3, 4, 5}. There isn't a productive systemic chain yet, but it can change since the sanction of Brazilian law nº 12.484² which stimulate sustainability of native formation and bamboo cultivation with focus on culm production, shoots extraction and environmental services. Young bamboo culm has a rich composition, and it could be used as an alternative to the market demand of fiber extraction.

So, the aim of this work was to evaluate the chemical composition of young culm flour of species *D. asper*, *B. tuldooides* and *B. vulgaris* for food application.

Results and Discussion

Table 1 shows the results obtained for all the samples availed. All the analysis was made in triplicates, accorded to AOAC (1998) methodology¹ and availed by difference among the parts of bamboo culm, by variance analysis (ANOVA) and by Scott-Knott Test ($p < 0.05$).

Table 1. Physicochemical composition of young bamboo culm flour of each portion ("bottom", "middle" and "top") of species *D. asper*, *B. tuldooides* and *B. vulgaris*¹.

Sample ^{II}	Nutrients (g/100 g)							
	Moisture	Protein	Ash	Lipid	Total sugar	Total starch	Total fiber	Other carbohydrates ^{III}
DAB	7,34±0,31 ^a	1,43±0,05 ^a	1,66±0,06 ^c	0,16±0,02 ^b	13,40±0,51 ^a	8,17±0,34 ^d	78,25±1,32 ^c	67,84
DAM	7,16±0,09 ^a	1,31±0,04 ^f	0,87±0,04 ^e	0,31±0,06 ^b	7,19±0,15 ^c	10,99±0,57 ^c	78,32±0,43 ^c	72,18
DAT	6,79±0,35 ^b	1,54±0,01 ^d	0,89±0,01 ^e	0,22±0,03 ^b	7,63±0,59 ^b	10,16±0,64 ^c	77,15±1,17 ^c	72,77
BTB	3,20±0,16 ^e	1,57±0,08 ^d	0,80±0,03 ^e	0,12±0,04 ^b	1,29±0,01 ^d	2,35±0,42 ^e	92,53±0,62 ^a	93,03
BTM	3,34±0,30 ^e	1,43±0,03 ^e	0,94±0,06 ^e	0,20±0,04 ^b	1,47±0,05 ^d	2,79±0,28 ^e	93,51±0,67 ^a	92,61
BTT	3,19±0,15 ^e	1,72±0,02 ^c	2,38±0,14 ^b	0,39±0,11 ^b	0,94±0,03 ^e	1,84±0,12 ^e	84,79±0,52 ^b	91,38
BVB	5,02±0,18 ^c	1,74±0,01 ^c	1,33±0,12 ^d	0,34±0,13 ^b	1,03±0,03 ^e	16,14±0,80 ^b	74,86±0,78 ^d	90,53
BVM	4,12±0,21 ^d	1,85±0,01 ^b	1,58±0,12 ^c	0,35±0,04 ^b	1,06±0,02 ^e	17,18±0,72 ^a	64,36±0,50 ^e	91,05
BVT	4,85±0,11 ^c	2,03±0,01 ^a	2,77±0,05 ^a	0,76±0,48 ^a	1,38±0,10 ^d	17,75±0,85 ^a	64,58±0,15 ^e	88,22

¹ Expressed as mean ± standard deviation. Means followed by the same lower case letters in the same column did not differ ($p < 0.05$) by Scott-Knott test. ^{II} Young bamboo culm flour, respectively portions of bottom, middle and top of varieties *D. asper* (DAB, DAM and DAT), *B. tuldooides* (BTB, BTM and BTT) and *B. vulgaris* (BVB, BVM and BVT). ^{III} Calculated by difference: 100-moisture-protein-ash-lipid-total sugar-total starch-total fiber.

All the samples had low contents of moisture¹ (<10 g/100g) and protein¹, ash¹ and lipid¹ lower than 3 g/100g, what were expected from the flour production processing. The samples also showed a high content of other carbohydrates (>67%). Specie *D. asper* had the highest values for total sugar¹ (7–13%). Additionally, species *D. asper* and *B. tuldooides* presented the highest contents of fiber¹ (77–93%), while starch contents¹ (16–17%) were higher for specie *B. vulgaris*.

Conclusion

Young bamboo culm flour presents great potential for food application because of its high fiber and starch contents. Species *D. asper* and *B. tuldooides* showed

potential for fiber extraction, while specie *B. vulgaris* for starch extraction.

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¹AOAC (1998). Official Methods of Analysis. Vol. 16. Association of Official Agricultural Chemists.

²Lei nº 12.484, de 8 de setembro de 2011 dispõe sobre a Política Nacional de Incentivo ao Manejo Sustentado e ao Cultivo do Bambu (2011).

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