CHARACTERIZATION OF BLACK BEAN CULTIVARS FOR PROCESSING

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Common beans are widely consumed in Brazil, being considered the ingredient symbol of Brazilian gastronomy. Their acceptability is connected with various characteristics such as color, size, appearance, cooking time and flavor. Delayed cooking time has always been a limiting factor for purchase and preparation, especially for long time stored old beans; resulting in sensory and nutritional losses. The objective of this work was to evaluate some physicochemical characteristics of black bean cultivars required by the bean processing industry and related to quality. Eight cultivars of black beans (BRS 7762 Supremo – "SUP", Xamego – "XAM", Diamante Negro – "DN", BRS Campeiro – "CAMP", BRS Esplendor – "ESP", Ônix, BRS Grafite – "GRAF", BRS Valente – "VAL") from the 2010 cropping season (Santo Antônio de Goiás-GO) were donated by Embrapa Common Bean National Breeding Program and tested in the Grain and Byproducts Laboratory at Embrapa Rice and Beans Research Center for: minimum cooking time in Mattson Cooker Apparatus [1]; % of water absorption before (WABC) and after (WAAC) cooking [2,3]; determination of color parameters L^*, a^* and b^* in raw and cooked beans in colorimeter (Color Quest XE; HunterLab; USA); instrument texture evaluation of the cooked bean by texture analyzer (TA.Xtplus, Stable Micro Systems, Surrey, United Kingdom; probe P/2 (2 mm Cylinder Stainless), using charge cell of 50 kg) [4]; grain moisture content after oven drying at 105ºC [5]. Samples conditioning for the texture test followed two cooking methods: in oven (water soaking (1:3) for 16 hours in glass flasks; taken to oven at 105ºC for two hours, and resting for 30 min. at room temperature); in autoclave (30 g samples were placed in flasks with 100 mL of distilled hot water and taken to the autoclave for 15 min. at 121 ºC, and further resting at room temperature for 30 min.) [6]. Data was submitted to the analysis of variance and Tukey test was applied for mean comparison at 5% probability using SAS program [7].

Significant differences were observed among samples evaluated (Table 1). For moisture, only SUP and ESP were superior, but all samples were within a uniform moisture content range. Regarding color, ESP had beans less dark than SUP and VAL (lower L^* values, Table 1). After cooking, all samples showed a more intense color, especially XAM and DN, with the lowest L^* values, and ESP showed the lightest color, being more sensible to discoloration. Cooked beans presented a tendency to change to purple (values of $a^*>0$) and yellow (values of $b^*>0$), and values higher than a^* and b^* were observed in CAMP and ESP. For cooking time, SUP was considered resistant, being associated to the highest hardness values after autoclaving. All samples had broth with dark chocolate color, except SUP, CAMP and ESP, which had light chocolate broth color. It was observed that cooking in autoclave, usual in the industry, generated the lowest hardness values when compared to oven cooking; demonstrating to be a process that strongly affects grain structure. Besides, there were differences in performance according to the cooking process applied. DN presented the lowest cooking time and the lowest hardness values, regarding cooking method. GRAF had the cooking time similar to DN, and the lowest hardness value after autoclaving, but the highest in oven. WABC was normal, without significant differences among varieties, but with significant differences after cooking (WAAC), where variety GRAF showed the highest value and ESP the lowest. These results are linked to the yield of cooked beans. After visual evaluation, it was observed that all cooked samples had good appearance, with small amount of cracked beans.

There is variability in the performance of the cultivars tested for the attributes evaluated, especially for DN with good grain color stability after cooking, among other characteristics, followed

by CAMP, with good texture. The majority of samples showed good industry processing and commercialization potential as pre cooked food, without expressive loss of technological quality.

Table 1. Characterization of color[i], moisture[ii], cooking time[ii] and instrumental texture of black bean cultivars tested (means ± standard deviation).

		Color – L*			Texture after autoclave[iii]		Texture after oven[iv]	
Black Beans	**Moisture (%)**	**Raw**	**Cooked**	**Cooking time (min)**	**Hardness (N)**	**Stickiness (N)**	**Hardness (N)**	**Stickiness (N)**
SUP	9.03±0.27a	32.19±0.51b	21.25±1.68cd	37.22±1.03a	1.03±0.43a	-0.21±0.06c	16.50±1.09b	-0.11±0.03c
XAM	7.44±0.08b	32.54±0.63ab	17.25±0.31e	29.87±0.11b	0.95±0.27ab	-0.19±0.04bc	15.52±1.14bc	-0.11±0.03bc
DN	7.71±0.07b	32.43±0.41ab	17.55±0.62e	28.84±0.72b	0.80±0.23abc	-0.15±0.04ab	14.65±1.46c	-0.08±0.03ab
CAMP	7.49±0.09b	32.44±0.51ab	24.15±2.14ab	33.95±2.23ab	0.93±0.21abc	-0.13±0.03a	15.56±2.25bc	-0.08±0.03ab
ESP	9.15±0.25a	32.99±0.50a	26.32±1.56a	34.05±2.99ab	0.71±0.19abc	-0.18±0.03abc	16.91±1.76b	-0.07±0.03a
ÔNIX	6.89±0.03b	32.61±0.56ab	20.08±1.38d	31.87±0.08ab	0.62±0.14bc	-0.13±0.03a	16.27±1.69bc	-0.09±0.02abc
GRAF	7.84±0.14b	32.57±0.45ab	22.81±0.98cd	28.07±2.91b	0.55±0.21c	-0.14±0.03a	19.34±1.79a	-0.09±0.03abc
VAL	7.32±0.46b	32.23±0.40b	21.68±2.32cd	30.75±0.39b	0.78±0.29abc	-0.14±0.03ab	15.35±2.17bc	-0.09±0.03abc

[i](n = 10); [ii](n = 3); [iii](n = 10); [iv](n = 20). Means followed by the same letters in rows do not differ according to Tukey ($p < 0.05$).

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