

PHYSICOCHEMICAL CHARACTERISTICS OF COMMON BEANS RELATED TO QUALITY

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Different bean cultivars from a commercial group respond differently in terms of physicochemical parameters related to quality, and these responses can be decisive for cultivar selection. In this work some technological and nutritional traits of five dry bean (*Phaseolus vulgaris* L.) cultivars from commercial groups carioca (BRS Horizonte - A1; BRS Pontal - A2; and BRS Requite - A3) and black (Grafite - A4; and BRS Supremo - A5) were evaluated. These cultivars were developed at Embrapa Rice and Beans Research Center, by the bean breeding program and were harvested in October 2006. Soluble solid contents were determined as well as grain color of both cooked and uncooked beans. Broth rheological measurements were performed at 24C, using Brookfield viscosimeter with concentric cylinders, and electrical conductivity data were obtained at 25C.

Data presented in Figure 1 indicate that soluble solid content can be used as a quality parameter to determine dry bean shelf life status, considering that it quantifies the released solid amounts after the cooking process. Fresh harvested beans of both commercial groups carioca and black presented average values of soluble solids of 7.5% and 7.95%, respectively. Below these amounts beans can be classified as old. Bean soluble solid contents are affected by the cultivar itself, and can be used as a quality parameter to differentiate cultivar acceptability by consumers.

BRS Requite and BRS Supremo, respectively from carioca and black groups, presented the highest contents of soluble solids. Soluble solid content data were not proportional to broth viscosity due to the cooking thermal treatment used. This has probably influenced protein solubility causing protein degradation and formation of aggregates followed by fast sedimentation, which generated incorrect viscosity results. To avoid such event, it may be necessary to try an alternative method, such as the Oswald viscosimeter. Broth viscosity has a Newtonian behavior which is independent of the solid contents in the broth (Fig 2) as well as of the variety tested. As far as tegument color is concerned, there is a correlation between uncooked and cooked beans, since gloss intensity (L) of the carioca commercial group is higher in uncooked grains. In contrast, tegument gloss of black beans is intensified after cooking (Table 1). In relation to "a" and "b" parameters, carioca uncooked grains presented less red and yellow colors as compared to cooked grains in which both parameters were intensified. Carioca grains presented the same behavior although less intense due to discoloration during the cooking process (Table 2). Broth electrical conductivity was also affected by variety (Figure 3) but may be used to determine quality of fresh harvested grains of both carioca and black commercial groups. Values above 3,87mS/cm and 3,95mS/cm, respectively for each commercial group, indicate that grains should be considered old.

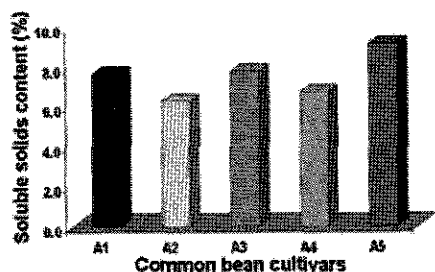


Figure 1. Soluble solids content of broth from common bean cultivars of the commercial groups carioca (A1=BRS Horizonte, A2=BRS Pontal and A3=BRS Requite) and black (A4=BRS Grafite and A5=BRS Supremo).

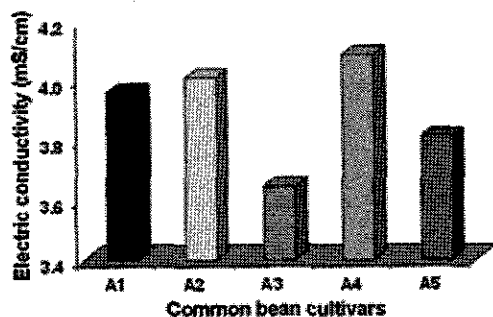


Figure 3. Electric conductivity values (mS/cm) for different analyzed common bean broth.

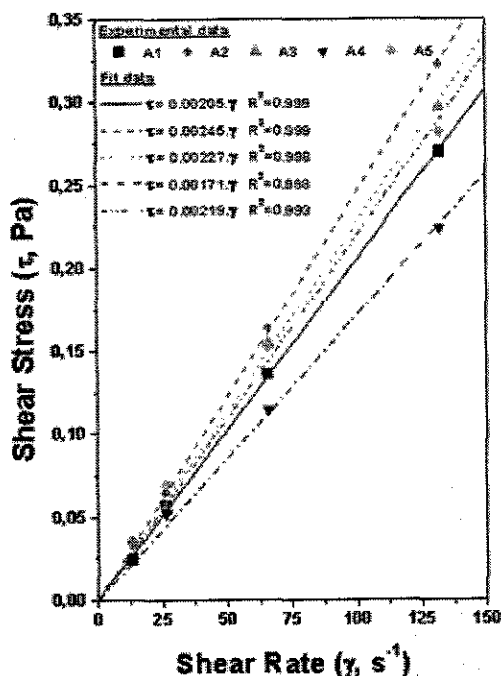


Figure 2. Shear stress (τ , Pa) as a function of Shear rate (γ , s⁻¹).

TABLE 1 – Skin color results of different analyzed raw common beans.*

Samples	Color of raw skin		
	L	a	b
A1	57.255 ^a	2.555 ^a	10.475 ^a
A2	56.275 ^a	2.755 ^a	10.020 ^a
A3	53.300 ^b	2.577 ^a	8.855 ^b
A4	30.587 ^A	-0.495 ^B	-0.613 ^B
A5	30.633 ^A	1.473 ^A	0.295 ^A

* Means followed by identical lower case letters and capital letters in the same column are not different by Tukey test ($P < 0.05$).

TABLE 2 – Skin color results of different analyzed cooked common beans of carioca and black commercial groups.*

Samples	Color of cooked skin		
	L	a	b
A1	41.863 ^a	5.295 ^b	13.240 ^a
A2	42.335 ^a	6.157 ^a	13.625 ^a
A3	42.877 ^a	4.965 ^b	12.005 ^b
A4	31.950 ^B	4.805 ^B	4.172 ^B
A5	33.447 ^A	9.992 ^A	6.050 ^A

* Means followed by identical lower case letters in the same row are not different by Tukey test ($P < 0.05$).