CANNING QUALITY OF BEAN CULTIVARS FROM DIFFERENT CLASSES CONSUMED IN MEXICO

P. Pérez Herrera[1], R. Rosales Serna[1], A. Hernández Montes[2] and J.A. Acosta Gallegos[3]
[1] Programa de Frijol. CEVAMEX, INIFAP. e-mail: Redserv@aol.com y rigoberto_serna@yahoo.com, [2] Departamento de Ingeniería Agroindustrial, UACH and [3] Programa de Frijol. CEBAJ, INIFAP. e-mail: jamk@prodigy.net.mx

Common bean is a traditional food staple in Mexico. Since ancestral times, the diet of the population has been based on the consumption of a legume-cereal complement: bean-corn. Beans are consumed after submitting them to a time consuming process, which includes grain soaking and cooking, and the seasoning of cooked bean. Recently, the consumption of canned beans has increased since this product is considered as a ready to use food. Since the development of the bean canning industry in this country, it has gradually grown, particularly in the decade of the 90´s, i.e., from 1994 to 1999 the increase in the production of cans was 1,237%[1], and it is still growing. At the present, two types of beans are being handled as raw material for the canning industry, black and light colored beans and only one factory is canning beans from different commercial classes separately. The knowledge of the canning quality traits of the cultivars grown in Mexico is important for the industry and for the breeders, therefore, in this note we report on the traits of four commercial classes that are grown in the main bean producing areas of Mexico.

Samples (100 g) from the bean classes: pinto, bayo (cream), flor de mayo (pink) (lighted colored beans) and black beans, were blanched at 80°C for 3 min, canned in 303 X 406 cans with 350 ml of brine (1.25% saline solution) and cooked in a retort at 115.6°C for 45 min.[2] Canned beans were stored one week and afterwards tested for: drained weight, bean volume, broken grains in cooked beans, and grain and broth color (hue, chroma and luminosity), viscosity of broth and cooked grain texture.

The grain of the studied commercial classes showed distinctive physical traits in: grain color, size and appearance, although small differences among cultivars within each commercial class were also present. The pinto class showed the highest values for drained weight and volume of canned beans (247.0 g and 246.3 ml, respectively), followed by flor de mayo and black classes; whereas the bayo class showed the lowest values for those traits (232.8 g and 219.4 ml, respectively) (Table 1). Pintos can be considered as a high yielding class for the production of canned beans in both types of presentations: whole grain and refried beans. The bayo class showed the lowest proportion of broken grains in canned beans (11.5 %), and consequently broths of low viscosity (42.8 cps), thus, it can be considered as an outstanding class for bean canning as whole grain in spite of its low yield. This class is used in central and northern Mexico for soupy dishes. Broken grain percent was the trait with the highest variability among the studied traits.

The three commercial classes of light colored beans: flor de mayo, pinto and bayo showed similar color traits (hue, chroma and luminosity) in broth and in canned grains, therefore, the mixture of clear colored beans can render canned products with similar color properties, and the possible use of mixtures should be studied.

On the other hand, the intermediate yields (in weight and volume) of black bean and their particular color characteristics for broth and cooked grain, make them suitable as raw material for canned black bean, as whole grain and refried beans.

Unexpectedly, the canned grain of the pinto and bayo classes, known by their characteristic long cooking times, showed lower grain firmness values than those considered as representative of the classes of fast cooking beans (flor de mayo and black beans) (Fig. 1). Those results might be due to the sticky consistence of flor de mayo and black cooked beans and the existence of smaller spaces among cooked grain (caused by the relatively small size of cooked grain), enhanced by the method used for texture measurement (cell extrusion in a Texture Analyzer).

Table 1. Basic statistics for canning quality traits in four commercial classes of common bean.

Trait	Flor			Pinto			Bayo			Black		
	Mean	D S	C V	Mean	D S	C V	Mean	D S	C V	Mean	D S	C V
DW (g)	239.55	17.88	7.46	247.02	12.89	5.22	232.83	18.76	8.06	239.32	15.26	6.38
CGV(ml)	239.30	22.87	9.56	246.31	26.74	10.9	219.38	12.17	5.55	238.63	24.27	10.2
BG (%)	38.93	20.62	53.0	32.53	18.53	57.0	11.75	11.53	98.1	28.31	14.49	51.2
B Hue (°)	50.80	2.47	4.86	57.84	6.12	10.6	52.66	1.22	2.32	44.48	2.87	6.45
B Chroma	19.43	3.73	19.2	16.61	3.36	20.2	18.18	2.35	12.9	12.58	2.79	22.2
B Lum	28.84	5.78	20.0	30.20	5.30	17.5	28.37	3.38	11.9	15.65	3.96	25.3
CGHue(°)	48.21	3.45	7.16	51.04	4.66	9.13	49.81	1.90	3.81	34.23	3.00	8.76
CGChroma	24.89	2.82	11.3	25.41	5.44	21.1	24.85	2.28	9.18	10.47	1.35	12.9
CGLum	31.37	3.14	10.0	32.30	4.35	13.5	30.74	3.22	10.5	17.27	2.14	12.4
Visc (cps)	118.95	113.1	95.1	123.36	89.1	72.2	42.75	21.09	49.3	125.54	69.61	55.4

DW= Drained weight, CBV= 100 g dry bean volume after canning, BG= Broken grain, B= Broth, CG=Canned grain, Visc= Viscosity.

The canning quality traits studied showed variability among commercial classes (specially broken grains). The specific uses of the bean grain by canning industry can be determined for the different commercial classes, on the basis of their particular attributes.
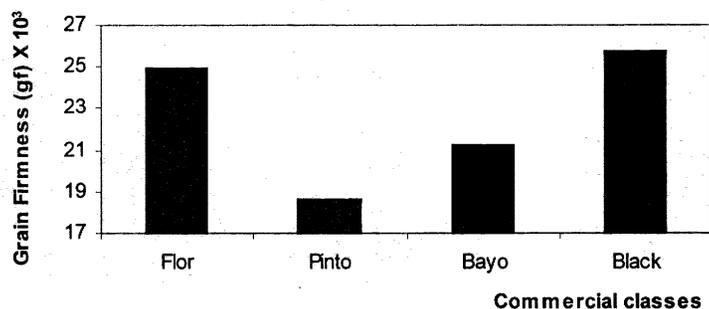

Fig. 1. Texture of canned bean in four commercial classes of common bean.

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