

Breeding white seeded bean cultivars for improving quality

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Introduction

Common bean (*Phaseolus vulgaris*) is considered as the most important legume for human consumption. Its production is extended in North of Spain, where it is very frequent to cultivate the traditional landraces, for own supply and for local markets.

In Spain, as well as in other European countries, white seeded bean cultivars have special interest for consumers and processors. Particularly some types with large kidney or similar seed shape have a relevant added value in the market. These are the cultivars known as riñón (kidney type) and galaica or faba (extra-large-seeded), very often cultivated in North of Spain. These two varieties are one of resource with more potentiality to use in breeding, because the sensorial and nutritional quality of their seed.

At the MBG-CSIC (Misión Biológica de Galicia - Higher Council for Scientific Research, Pontevedra, Spain) there is a bean germplasm collection that includes landraces, cultivars and including breeding lines. The accessions number are higher 1195. Some of the accessions of this collection of the above mentioned types riñón and faba are characterised by white and large seed, and good sensorial qualities referred to water absorption and hard-shell proportion (Ron et al,1998). The characteristics of these cultivars permits to include them in the Andean race Nueva Granada: T-phaseolin, indeterminate growth habit, type of seed and hairy leaves (Singh et al, 1991). The objective of this study is to show the value of traditional landraces for breeding focused in the improvement of seed quality.

Materials and methods

Plants materials: They were used eleven cultivars of kidney variety and fifteen cultivars of galaica variety, from Bergantiños (La Coruña, Spain) and La Mariña (Lugo, Spain), included in the germplasm collection at the MBG-CSIC (Pontevedra, Spain).

Agronomic and quality traits: The agronomic traits evaluated in the cultivars were: growth habit, leaf form and hairy leaf, and the quality traits are: length and weight of seed, water absorption and hard-shell proportion (Bourne M.C.,1967).

The length is evaluated in ten seeds and it is expressed by mm and the weight is evaluated in one hundred seeds and it is expressed by g. These traits are indicative of seed size. Moreover, it is evaluated the weight of one hundred seeds after eighteen hours in water, and then it is calculate the water absorption in %.

Phaseolin: A small sample from cotyledons of five seed of each cultivar was use for phaseolin determination using one dimensional sodium dodecyl-sulphate-polyacrilamide gel electrophoresis (1D SDS-PAGE) (Gepts et al, 1998).

Results and discussion

All the cultivars evaluated have the characteristics of Andean race Nueva Granada. In the table 1 there are results of agronomic and quality traits evaluated and the results of SDS PAGE. These results confirm that it above mentioned. It is more important for the breeding of this cultivars because the seed of this race presents a good characteristics and this facilitate the breeding programs.

Both of two varieties have a white big seed, their weight are 70g/100 seeds and 119g/100 seeds respectively . They present good sensorial qualities referred to water absorption higher than 100%, that increase the rendement production after cooking, and the hard-shell proportion, which is approximately 7% and this is a characteristic important in culinary quality (Ron et al,1998). Then, starting from these two varieties, it could be obtained much better results in breeding programs than the results obtained with others varieties, wich characteristics less advantageus.

References

Ron A. M. de, A. P. Rodiño, M. Santalla, I. Montero. Evaluación preliminar de las características nutritivas y sensoriales del grano de las variedades de judía común galaica y riñón. *Actas de Horticultura* 22: 222-227

Singh S. P., P. Gepts, D. Debouck. 1991. Races of common bean (*Phaseolus vulgaris*, Fabaceae). *Economic Botany* 45: 379-396

Bourne M. C.. 1967. Size, density and hard-shell in dry beans. *Food Technology* 21: 335-338

Gepts P., Bliss F.A..1998. Dissemination pathways of common bean (*Phaseolus vulgaris*, Fabaceae) deduced from Phaseolin electrophoretic variability. *Economic Botany* 41(1): 86-104

Table 1: Agronomic and quality traits

Name	Type	Growth habit	Leaf form	Hairy leaf	Seed length	Seed weight	Seed Absorption	Seed Hard-shell	Phaseolin
PHA-0184	kidney	3	Ovate	Y	18.3	53.1	116.6	7.3	T
PHA-0185	kidney	3	Ovate	Y	17.7	75.7	118.0	8.0	T
PHA-0187	kidney	3			18.4	57.0	112.1	7.4	
PHA-0195	kidney	1	Ovate	Y	16.1	48.6	117.9	6.9	T
PHA-0196	kidney	3	Ovate	Y	17.7	62.8	112.3	7.7	T
PHA-0201	kidney	3	Ovate	Y	17.9	62.9	112.8	8.3	T
PHA-0255	kidney	3	Ovate	Y	18.1	71.3	116.0	7.5	T
PHA-0341	kidney	3			19.3	67.9	114.7	7.1	
PHA-0838	kidney	3			18.8	95.1	111.4	7.4	
PHA-0842	kidney	3			18.7	88.1	116.9	7.1	
PHA-0843	kidney	3			18.3	90.5	115.5	7.3	
PHA-0917	Galaica	4	Ovate		22.9	118.6	153.7	6.5	T
PHA-0918	Galaica	4	Ovate	Y	24.4	133.4	187.9	6.3	T
PHA-0919	Galaica	4	Ovate	Y	23.3	136.1	201.4	6.4	T
PHA-0920	Galaica	4	Ovate	Y	23.7	139.9	192.1	6.6	T
PHA-0921	Galaica	4	Ovate	Y	21.8	108.7	136.5	6.7	T
PHA-0922	Galaica	4	Ovate	Y	23.6	126.1	180.3	6.6	T
PHA-0923	Galaica	4	Ovate	Y	23.2	114.2	161.5	6.3	T
PHA-0924	Galaica	4	Ovate	Y	22.8	111.2	146.0	6.3	T
PHA-0925	Galaica	4	Ovate	Y	24.0	125.1	168.8	5.9	T
PHA-0926	Galaica	4	Ovate	Y	22.7	115.0	140.3	5.0	T
PHA-0927	Galaica	4	Ovate	Y	22.7	113.5	141.6	6.5	
PHA-0928	Galaica	4	Ovate	Y	23.9	131.6	186.7	6.3	T
PHA-0839	Galaica	4			21.7	118.0	121.0	6.1	
PHA-0840	Galaica	4			22.9	117.0	129.5	7.1	
PHA-0841	Galaica	4			21.4	122.4	128.5	7.1	