

TEN YEARS OF RESEARCH AND DEVELOPMENT IN *Phaseolus vulgaris* L. IN VALENCIA (SPAIN)

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INTRODUCTION

In Spain the area of land used for cultivating dry-bean crop has diminished continuously since 1940. There are many reasons for this trend, including the low productivity and profitability of this species. The Spanish cultivars are susceptible to a number of diseases, but BCMV, which is wide-spread, can be considered as the most important and decisive one affecting this crop.

Our work group (University-Enterprise) was the first in Spain to set up an improvement project with the objective of developing new dry-bean cultivars, from the principal Spanish ones, with genetic resistance to BCMV and BCMNV. In order to do this, we have carried out genetic, virologic and agronomic studies, which have given us the base from which to achieve our aim.

In this communication we summarize the lines of work that our group has developed, together with the most relevant results.

LINES OF RESEARCH

- 1.- Prospection and evaluation of germplasm.
 - a) Prospection.
 - b) Assays of adaptation and yield.
- 2.- Culture techniques.
 - a) In the greenhouse (types of substrate, fertilizer and times of application).
 - b) In the open air (dosis of seed and use of bio-stimulant substances).
- 3.- Effectiveness of artificial hybridization.
- 4.- Identification of BCMV and BCMNV strains in Spain.
- 5.- Genetic studies.
 - a) Genotypic study of Spanish cultivars with respect to resistance/susceptibility to BCMV.
 - b) Estimation of the additive value of segregating individuals, applying Mixed Model Methodology (BLUP).
 - c) Estimation of genetic, environmental and phenotypic correlations, by means of traditional procedures and REML.

- d) Genetic study of quantitative characteristics following the Mather & Jinks methodology.

6.- Improvement programs.

Application genealogical and back-crossing methods, with evaluation at the level of individual plants, to introduce the genes I, bc-1² y bc-2² ó bc-3.

7.- Other studies: Use of artificial vision to classify the cultivars according to the shape and size of the seed.

RESULTS

Of the thousands of different genotypes assayed for adaptation, only approximately 10% adapted well to the agroclimatic conditions in the principal Spanish regions where beans are grown. A proportion of these genotypes, those with highest yield, were used as parents in the hybridization improvement programs.

Currently, 106 lines of a number of varietal types resulting from these improvement programs have been multiplied, these are advanced or finalized, with the resistance gene I, differences in growth habit and productivity, different grades of earliness, and good culinary quality. A total of 11 of these lines have been officially registered as new commercial varieties.

The prospection, and study of diseased plants with respect to BCMV and BCMNV using differential cultivars, indicate that the strains Fla, NL-3 and NL-4 are present in Spain, although there is a predominance of non necrotic strain.

Regarding the genetic studies, we stress the use of the mixed model methodology (BLUP) in this autogamous species, unused so far, for additive genetic evaluation of segregating hybrids, as well as the estimation of Co(Variance) components by means of REML for a multivariate model.

ACKNOWLEDGMENTS

Drs. Singh, Voysest, Morales, Castaño, Kornegay and Drijfhout for scientific assistance and supplying us with the vegetable material. The Spanish Public Organizations CICYT, CDTI, IMPIVA and INIA for their economic support through various research projects.