



HAL
open science

On-farm breeding of bean populations, an approach of genetic diversity evolution

Estelle Serpolay-Besson, Isabelle Goldringer, Valeria Negri, Lorenzo Raggi, Carlo Tissi, Veronique Chable

► To cite this version:

Estelle Serpolay-Besson, Isabelle Goldringer, Valeria Negri, Lorenzo Raggi, Carlo Tissi, et al.. On-farm breeding of bean populations, an approach of genetic diversity evolution. SOLIBAM 1st Stakeholder congress, Apr 2012, Rome, Italy. 1p. hal-01210052

HAL Id: hal-01210052

<https://hal.science/hal-01210052>

Submitted on 6 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



SOLIBAM – WP2 and 6

On-farm breeding of bean populations, an approach of genetic diversity evolution



Estelle Serpolay¹, Isabelle Goldringer², Valeria Negri³, Lorenzo Raggi³, Carlo Tissi³, Véronique Chable¹

¹INRA SAD Paysage, 65 rue de St Brieuc, 35 042 Rennes Cedex, France, estelle.serpolay@rennes.inra.fr
²INRA, UMR8120, 91190 Gif sur Yvette - France, isa@moulon.inra.fr
³Dip. Biologia Applicata, Università degli Studi di Perugia, Borgo XX Giugno 74, 06121 Perugia - Italy, vnegri@unipg.it



Solibam workpackages:

✓WP2, T2.1 – Adaptation of several kinds of markers to be used in breeding populations of different species, for identification of polymorphism. Testing some markers one different selection of one bean population.
 ✓WP6, T6.3 – Identifying the effects of farmers' mass selection and measuring the evolution and adaptation of bean plant populations in terms of genetic and phenotypic diversity.

Objectives

The trial aims at exploring the plasticity of bean populations subjected to different farmers' selection and their environment. Their evolution described at both phenotypic and genetic (with molecular markers) levels.



Stakeholders/partners

Researchers and engineers from INRA and UNIPG, Dutch and French farmers.

Methodology

This experimentation was performed within two successive European research projects, Farm Seed Opportunities (FSO) and SOLIBAM.

On-farm breeding (in FSO and SOLIBAM-WP6)

At the beginning of the FSO project (2007-2009), a bean population, FC, has been distributed to different farmers of The Netherlands and France. They were in charge of cultivating and breeding of the variety for three years. Their criteria of selection were registered. Seed samples were collected after 2009 harvest. The genealogy of the farmers' populations was recorded (figure 1). Some of the farmers (JLB and RG) identified sub-populations during the process.

Molecular analyses (WP2)

Molecular analyses were performed on farmers' samples compared to the original. (2006 seeds) bean population 11 SSR markers were genotyped by UNIPG at the beginning of 2012 on plantlets from seed collected. Ten sub-populations were tested and 8 to 12 individuals were genotyped (12 for conservation strategy and 8 for new sub-populations).

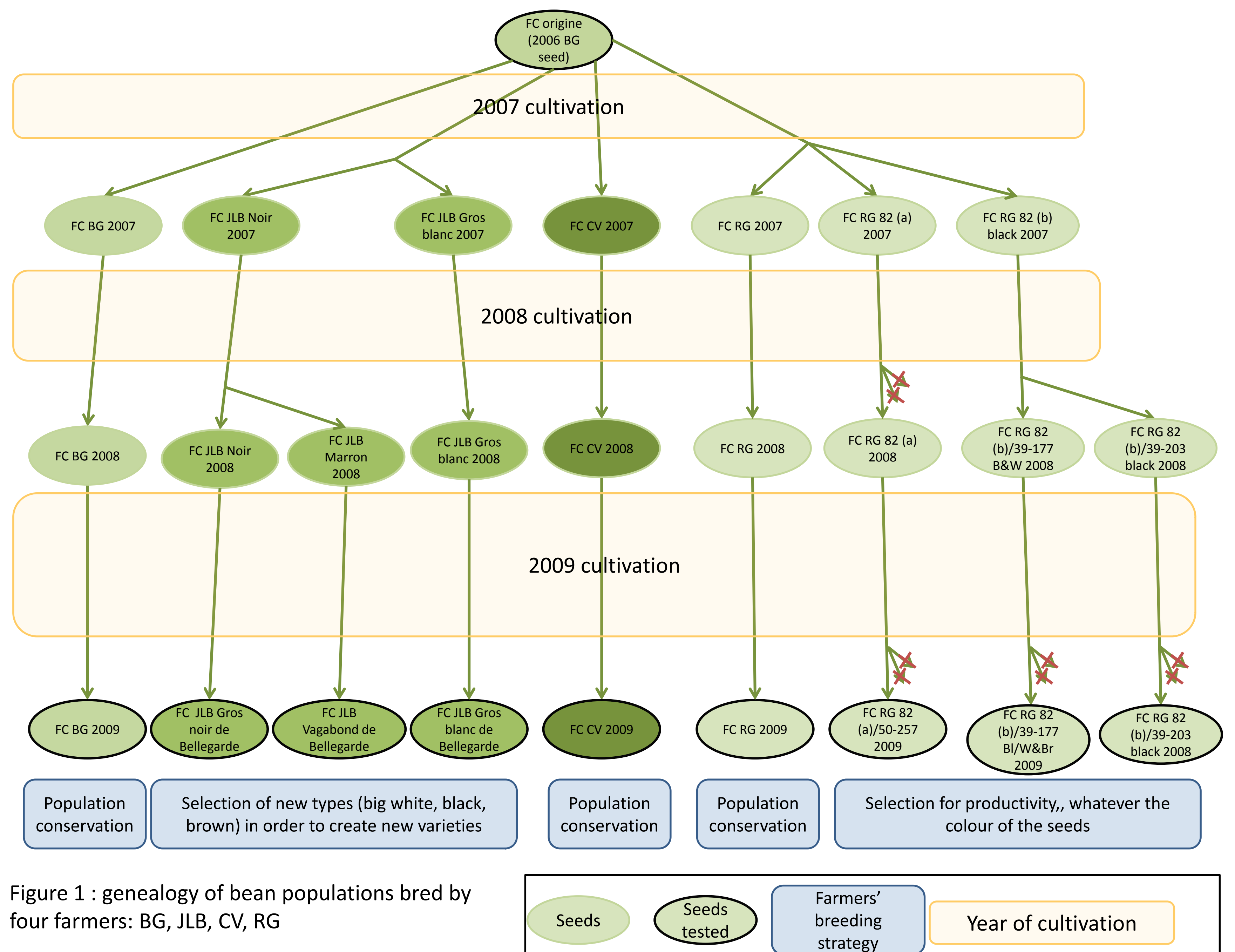


Figure 1 : genealogy of bean populations bred by four farmers: BG, JLB, CV, RG

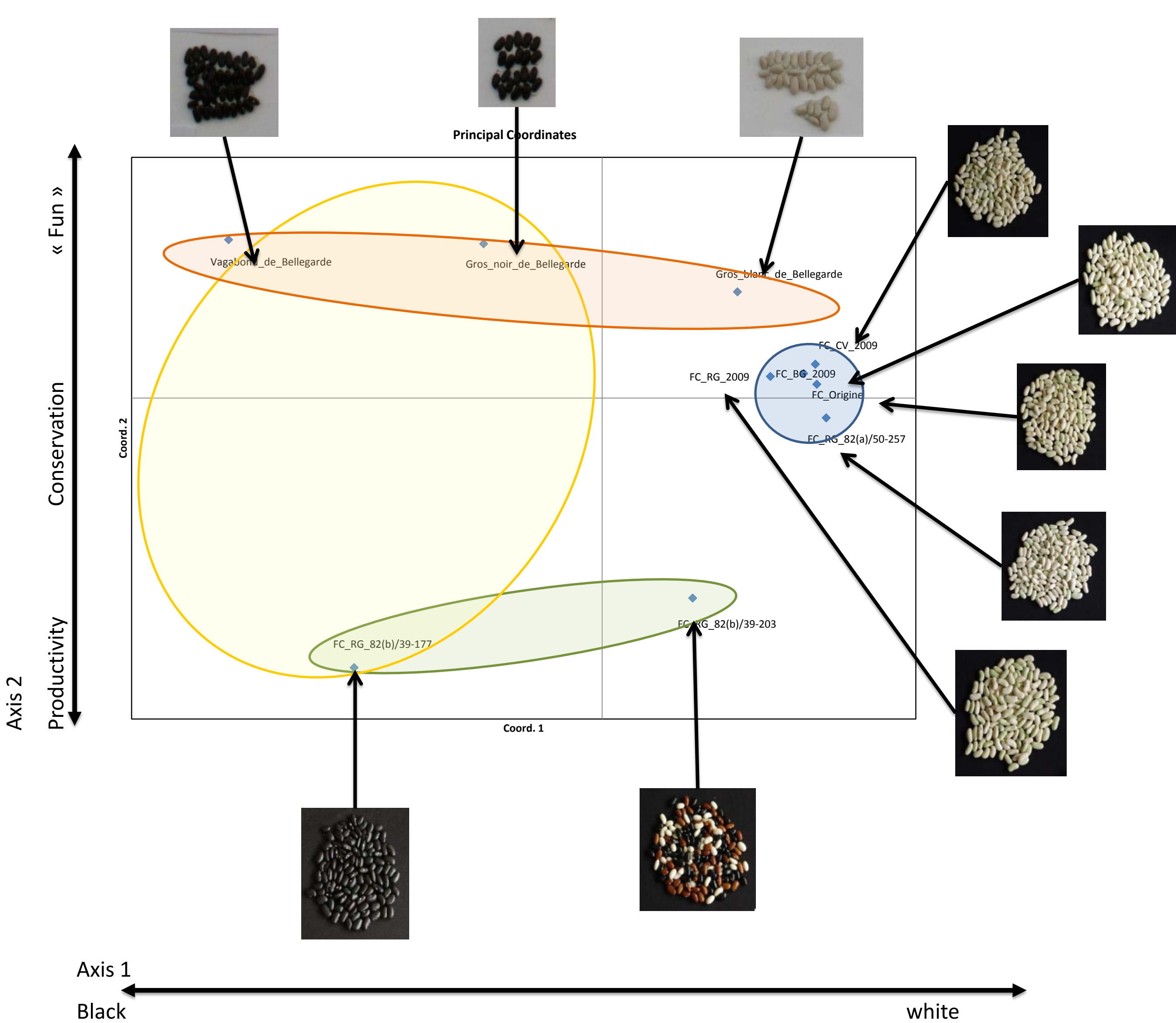


Figure 2: PCA on the 8 polymorphic markers and seed colour of beans from farmers' selection (axis 1: 71,43% and axis 2: 16,95%)

Results

Microsatellites

- 3 of the 11 microsatellites tested were monomorphic
- The 4 sub-populations FC RG 82(a), FC origine, FC CV and FC BG appeared to have the same genotype (same microsatellites for all the individuals of all the sub-populations)

PCA (Principal Coordinate Analysis)

On the PCA first plane (> 88% of the variation), we have highlighted 4 « groups » (figure2):

- the blue group: all of the populations are very closed to each other. This group includes the 4 populations with little variability (see above). All of them had white seeds, and were bred according to a conservation way, except FC RG 82(a), and the genotype of the original version was observed in this group.
- the orange and blue groups: the different populations of these groups are the result of the selection of 2 farmers (JLB in orange and RG in blue).
- the yellow group: the seeds of the populations of this group were black.

It is noticeable that axis 1 separates the populations according to the farmers' selections and axis 2 separates the populations according to seeds colour.

Acknowledgments

We would like to warmly thank the farmers René Groenen (from The Netherlands), Jean-Luc Brault, Colette Vialle and Philippe Catinaud (from France) for having conducted the experiment during the 3 years of the FSO project.

This publication was financially supported by the European Commission through the Collaborative Project (large-scale integrating project) "SOLIBAM", contract no. FP7 KBBE- 245058, under the 7th Framework Programme Farm Seed Opportunities, STREP project contract no. FP6 - 044345, under the 6th Framework Programme, priority 8.1, "Specific Support to Policies."

