WHAT CAN A LANDRACE CASE STUDY TELL US ABOUT ADAPTATION TRAITS?

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diversity, SSRs, outlier loci, selection, on-farm conservation

Awareness of the need for biodiversity conservation is now universally accepted. To date, conservation activities have mainly focused on ex situ and in situ conservation of wild species. However, the diversity between and within crop species also has a significant value. In domesticated crops, landraces have been, and still are, the primary source of genetic diversity for plant breeding. As such, landraces are vital genetic resources which should be maintained on farm and ex situ for future use. Few it is known about the organization of landrace diversity and about the forces acting in shaping it, although this knowledge is fundamental for breeding and conservation activities. A primary aim of this study was to obtain an insight in how variation has been built on under a cultivated environment and to identify loci that potentially underlie selective effects by using a landrace case study whose natural and human environment is known in details. Another aim of this study was to define an appropriate on farm conservation strategy for this threatened bean landrace, which can serve as a model for other threatened populations. Farmer seed lots of this landrace were examined for 18 morpho-physiological traits and 28 SSR molecular markers. Significant differences were found among them for both the morpho-physiological and molecular traits. A high level of genetic diversity and a significant genetic structure was detected among the farmer’s populations (Fst = 0.367). The landrace appears to be structured as a metapopulation in which a substantial differentiation is maintained at the subpopulation level. Evidence of locus-specific selective effects was obtained for four of the thirteen loci-differentiating subpopulations by either one of the statistical tests used (DetSel, Fdist2). Both the statistical tests showed one of these loci to be under selective pressure due to altitudinal gradient. Our data suggest that differential micro-environmental selection pressures and drift explain the observed pattern of LR diversity. An appropriate on farm conservation of a structured LR requires that subpopulations be maintained on the farms from which they come.