Microsatellite DNA markers to study genetic differentiation and dispersion capacities in three *Calliptaminae* species (Orthoptera, Acrididae)

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Introduction

Global changes have an impact on the species habitats and their uses. Some areas, as Languedoc in the Mediterranean basin, experiment since a long time, an important human pressure, in particular an important fall of agricultural practices. Considered as a biodiversity hotspot, Mediterranean landscapes represent a particular field of interest where changes in land use, lead to close favourable environments of some endemic or pests grasshoppers.

This work expects to know if changes in land use, encourage closure of the environment, could have an impact on *Calliptaminae* populations through different parameters as Genetic structure or Dispersion capacities.


Diversity of land use in Languedoc © E. Blanchet

Methodology

Models: Three *Calliptaminae* species, with different habitats, and different dispersion capacities: *Calliptamus italicus*, *C. barbarus*, *C. wattenwylianus*.

Sites: Three sites: Hortus, Aumelas, Larzac, having similar vegetation and differing by their geomorphology, climatic condition, and enclosure.

Sampling method: Random sampling on two sites (72km²) distant by 80 km, of three species. A GPS point has been taken for each individual.

Molecular tools: Microsatellite markers have been developed with an enriched library.

Analysis: microcheker, genetix, structure, geneland.

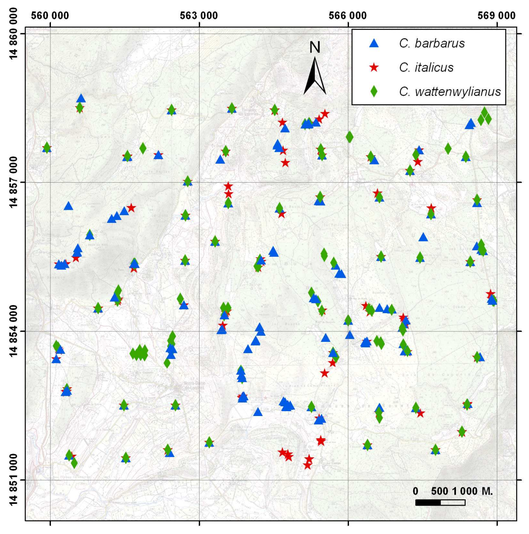

Fig.2: Individual GPS points, during sampling in 2007, on Plateau of Hortus. Each symbol represent one species.

Results

200 georeferenced samples per species and site (see Fig. 2).

Two polymorphic markers crossamplified on the three species (see Fig. 3)

Allele null frequency vary between 0.0777 and 0. 47035

(Microcheker, estimation of Chakraborty).

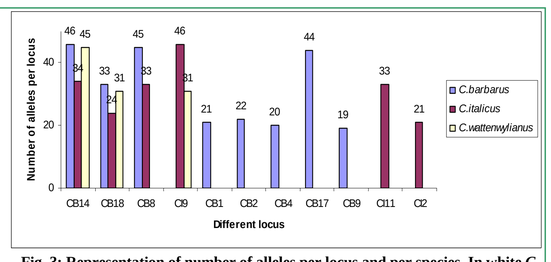

Fig. 3: Representation of number of alleles per locus and per species. In white *C. wattanwylianus*, in purple *C. barbarus* and in red *C. tialicus*.

	Nb.Locus/sp	Total alleles/sp.
C.italicus (CI)	5	191
C.barbarus (CB)	8	250
C.Wattenwylianus (CW)	3	107

Table 1: Number of microsatellite locus and total number of alleles per species.

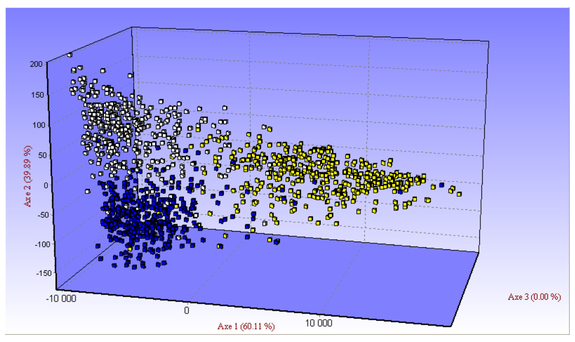

Fig. 3: Factorial Component Analysis in 3 D showing the distribution of our three species according three axes.

Two crossspecies locus (CB18 and CB14) discriminate the three species in three different clusters (see values in **Tab. 2**). *CB* in yellow, *CI* in blue and *CW* in white.

Table 2: Value of Fst

	CI	*CW*
CB	0.07596	0.08315
CI		0.0712

In following figures, representation of FCA in 3Dimensions with Genetix. Representation of differentiation between our sites, Aumelas in yellow and Hortus in blue, for each species.

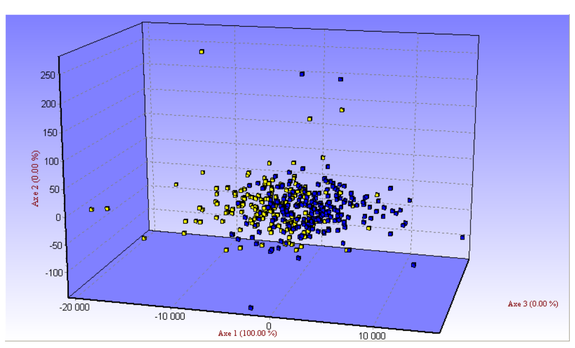

Fig. 4: FCA 3D of *CB* populations .

With 8 locus for *CB*. No differentiation is observed between our sites (Fst=0.00080.)

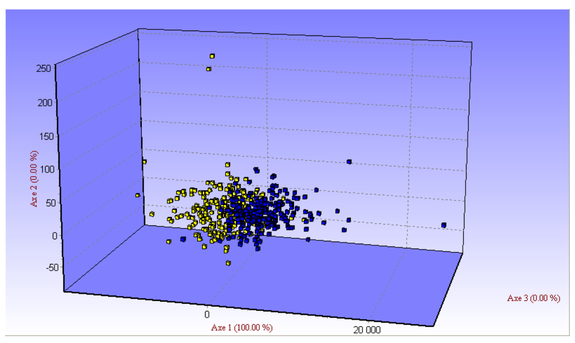

Fig. 5:FCA 3D of *CI* populations.

With 5 locus for *CI*. No differentiation is observed between our sites (Fst=0.0061) We observe more important Fis for this specie.

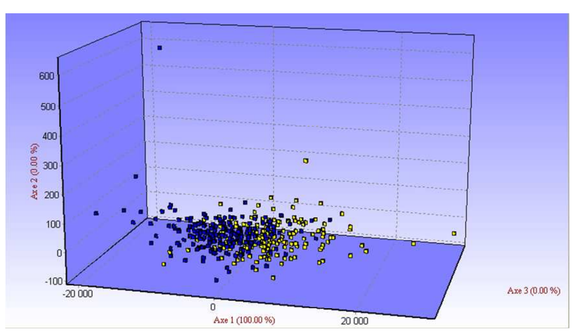

Fig. 6: Representation for an 3D FCA of *CW* populations.

With 3 locus for *CW*. No differentiation is observed between our sites (Fst=0.04824). Fis are more important than other species, but Fst are less important.

Discussion and Conclusion

❖Our locus are very polymorphic and as if some species have few markers, the number of allele is very important and enable preliminary genetic analysis. This same number can entail too problem to discern a low-level of differentiation between our sites.

❖ We observed an important frequency of null alleles. As all missing samples have been reanalysed, we think there maybe an important inbreeding frequency.

❖As we don't find differentiation between our sites, so our three species are able to disperse more than 80km. So we could explain this important homozygote frequency by the fact that population is very important. It would be interesting to have a comparison of density of our species with this result.

❖As if only two locus cross-amplify on our three species, we show, they enable to distinguish them clearly. They could be used for a quick identification method.

❖ In agreement with their morphology, *C.italicus* and *C. barbarus* can disperse over 80km. Some precisions must be done for *C. wattenwylianus*, which are the species who disperse less (short wings). And his Fst value isn't significant but upper than others.

❖ In order to clearly evaluate dispersion capacities of our three species is indispensable to sample in far away localities


Causse of Aumelas © E. Blanchet

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Locust Ecology and Control Research Unit

Site of Acridology Unit :http://www.cirad.fr/ur/acridologie

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