



Tropentag, September 17-19, 2013, Stuttgart-Hohenheim  
“Agricultural development within the rural-urban continuum”

## Morphological and Genetic Diversity of Cacao (*Theobroma cacao*) in San Alejandro, Peruvian Amazon

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### Abstract

Peruvian Amazon is the centre of origin of cacao (*Theobroma cacao* L.), which is an important crop in the region as it is an important source of income especially for smallholders. With the introduction of exotic hybrid germplasm, concerns of loss of the original genetic diversity and superior properties of original cacao varieties in the area emerge, as farmers give preference to high yielding hybrid varieties. This study assessed the morphological and genetic diversity of cultivated cacao in San Alejandro in Peruvian Amazon. Using two quantitative and eight qualitative morphological descriptors, 54 accessions were characterised and 84 accessions were fingerprinted by eight microsatellite loci. Mean Shannon-Wiener diversity index for the qualitative traits of morphological descriptor reached 0.95. Principal component analysis results showed qualitative descriptors of fruit form (apex form, fruit rugosity and basal constriction) and quantitative floral traits (sepal and style length) as the most distinctive. All microsatellite loci were polymorphic, with totally 77 identified alleles and 9.63 alleles per locus in average. Expected heterozygosity ranged from 0.571 to 0.844 and mean value 0.729. Mean value of allelic richness reached 4.03. Although neither analysis revealed any structure among the accessions, the results clearly showed that the study area harbours a highly diverse population of cacao with a number of original upper Amazon Forastero varieties. This high level of diversity can be explored for selection of superior clones. Farmers should be encouraged to preserve existing original varieties *in situ* in on-farm conservation programmes and further improve varietal deployment to prevent genetic erosion and loss of valuable germplasm.

**Keywords:** Descriptors, genetic diversity, microsatellites, morphological diversity, *Theobroma cacao*