

**Year of CfP: 2009**

**Project No 0902-007**

<b>Project title:</b> Reconstruction of 3D geometric model of plant from laser scanner data (PlantScan3D)
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**Unit managing the project:** AGAP (Genetic improvement and Plant adaptation) (CIRAD, INRA, Montpellier SupAgro)

**Project leaders:** Frédéric Boudon (AGAP) [frederic.boudon(a)cirad.fr] and Pierre-Eric Lauri (AGAP) [lauri(a)supagro.inra.fr]

**Countries involved in the project:** Finland

**Research units from the Foundation's scientific network involved:** LEPSE

**Sub-thematic axes:** IPB-1 (Integrative Plant Biology 1: *Genetics and genomics, plant breeding, ecophysiology*)

**Objectives:**

Automatic acquisition of plant phenotypes, and in particular of architecture phenotypes, constitutes a major bottleneck of the construction of quantitative models of plant development. This issue needs to be addressed now to bridge the gap toward predictive agronomic applications, by building and assessing accurate virtual plant models. Most of actual measurement methodologies are manual and extremely time consuming. This is a major issue at both national and international scales.

Recently, 3D Laser Scanners (SL3D) have made it possible to acquire 3D images on which each pixel has an associated depth corresponding to distance between camera and the pinpointed surface of the object. They are used in industrial applications (e.g. design of car) and medicine (e.g. prosthesis) where surfaces are usually continuous and regular. Their applications to the description of plants show however some additional difficulties due to their irregular geometric nature.

The objective of this project is to develop the use of laser scanner for plant geometry reconstruction. For this, we will develop methodologies and tools for the automation of numerical 3D acquisition of vegetal structures of different sizes, and develop new methods for the reconstruction of parsimonious geometrical and structural models usable in agronomical and biological contexts. Our work should provide to the plant modelling community a set of open source software for the automatic reconstruction of plant structure and geometry from laser scanner data.

**Total Agropolis Fondation funding:** €30,000 (travel expenses, small equipment)

**Funding category(ies):** Agropolis Fondation small grants (support for small exploratory, risky and innovative projects, « proof of concept », new frontier research), support to prepare applications for national or international calls for proposals (e.g. ANR and EU FPs))

**Project duration:** 01 September 2009 - 31 December 2011

**Keywords:** 3D model – plant – laser scanner – phenotype – automatic acquisition