Remote sensing and GIS techniques for supporting organic cotton certification process in West Africa.

In Burkina Faso, cotton accounts for 50 to 60% of the country's foreign currency earnings and is the first export product contributing largely to the country's economic development. Successful development of organic and fair-trade cotton since 2004 is a bright example of sustainable development that contributes to alleviation of poverty and improved food security by enhancing producers' income with less risk to run into debt, as well as by being a healthy way to crop both for people and the environment resulting in improved human and animal health (absence of chemical pesticides), and improved soil fertility and environment (organic cropping technique).

In order to be commercialized on the international market, organic cotton has to comply with established international standards and rules and to be certified by organic certification bodies. Part of this certification process is a field inspection concentrating on risk sensitive areas identified according to several criteria. This study is a first attempt in the African context to evaluate how remote sensing techniques could step in upstream of the certification process in order to spatially support the identification of suspicious cotton parcels declared as organic, for priority control. Using remote sensing provides an independent, practical and cost-effective way of control for remote areas sometimes difficult to access in the context of the developing countries rural areas. A previous innovative study (Denis A. et al, 2011), carried out in Europe on wheat and corn, enabled to discriminate up to 100 % of organic fields from non organic ones.

Technically, the objectives of this study are first to assess the potential bio-chemico-physical differences between organic and non organic cotton with diverse field measurements such as chlorophyll content, canopy cover, height and spatial heterogeneity, and secondly, to assess the ability of remote sensing techniques to assist the organic cotton certification process by testing its ability to discriminate between organic and non organic cotton fields.

The hypothesis was made that the different cotton management types, and in particular the different ways of fertilization and pest control, would lead to measurable bio-chemico-physico differences visible from remote sensing observations.

The study site is localized in the south-west of Burkina Faso and includes 100 cotton fields among which 50 organics and 50 non-organics. A SPOT5 image was acquired for the remote sensing indicators computation, but unfortunately very late in the cotton cropping season due to very cloudy atmospheric conditions.

The results show that, in the limited context of this study (area and tools), significant bio-chemico-physical differences exist between organic and non-organic cotton, and this for both field and satellite indicators. However the observed differences during this first attempt are not very pronounced and the different indicators values ranges largely overlap between cotton management types which prevent the use of these indicators alone to be a base for a robust discrimination. However the very late satellite image acquisition prevents to make any straight conclusion regarding the potential efficiency of this technique and further study with timely satellite acquisition should be carried out.