



## **Methodological developments for improving agricultural statistics for different typologies of countries**

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In several countries, the quality of agricultural statistics is low; in other countries, accurate statistics are produced for main agricultural variables at country level, but the accuracy of estimates for smaller geographic domains, like lower level administrative units, is very poor.

Particularly for developing countries, allocating high shares of public resources to data collection for producing agricultural statistics is a difficult choice. Thus, there is strong need to use efficient methods and some kinds of low cost information for improving the accuracy of estimates.

In some cases, administrative data play an important role, although some warnings should be kept in mind, see for example Carfagna and Carfagna (2010, 2013) and Carfagna et al. (2013). In other cases, some questions concerning agriculture are added to the population questionnaire, in order to create the list of rural households to be used for agricultural annual surveys (Keita and Gennari 2013). This approach allows saving the funds generally devoted to agricultural censuses, although the risk of under and over coverage can be relevant and very few auxiliary variables can be used for designing efficient annual sample surveys.

Due to the technological development, in the last decades, different kinds of geographic information have become easily accessible at decreasing prices and have started to be used for frame construction, sample design, estimation and yield forecasting. The role of Geographic Information Systems (GISs), Global Positioning Systems (GPSs) and remote sensing for creating different kinds of master sampling frame is analysed in Carfagna (2013).

A wide literature has been developed on the use of geo-referenced data for sample designs from various viewpoint, like optimal stratification, spatial sampling, and multiple probability proportional to size; Benedetti (2014) has made a very recent review and some methodological proposals on these topics.

In this paper, we focus on some statistical issues related to the use of geo-referenced information for agricultural statistics, namely the impact of interpolation, aggregation, disaggregation and integration on the estimation of agricultural parameters and on yield forecasting models.

**Keywords:** geo-referenced data, GIS operations, change of support, agricultural statistics