## Crop Area Estimates with Area Frames in the Presence of Measurement Errors

Elisabetta Carfagna
University of Bologna
Bologna, Italy
Email: elisabetta.carfagna@unibo.it

**Abstract:** The usual estimators of totals and means remain unbiased in the presence of measurement errors only if these errors are assumed to be additive, non-correlated and with a mean of zero. Often, these characteristics of errors do not hold in area frame surveys for crop area estimates and usual estimators of totals and means are biased and their variances overestimate their accuracy. In almost all important area fame survey projects for crop area estimates, a part of resources is devoted to quality control of data collected on area sample units.

These activities of quality control are important for evaluating the quality of estimates and for improving the quality of successive projects, provided that appropriate kinds of quality control are planned and executed based on sound statistical methodology.

The paper discusses focusing on the quality control of data collected by enumerators by observation of area sampling units. An appropriate ad hoc sample design for quality control will allow the estimation of measurement errors and their effects on crop area estimates and their accuracy. The author points out that, when the ground survey is conducted near the harvest, the usual procedures of quality control based on samples of lots of products (sets of enumerated sample units) are not appropriate for area frame crop estimation since crops are harvested during the time in which a lot is completed by the enumerator; thus, quality control has to be made in a very short time, during the enumeration process.

The author proposes to adopt a stratified sequential sample design for quality control where strata are determined by the different enumerators and other variables which can effect the correlation between errors. In fact, sequential sample designs generally allow reaching high precision of estimates with the smallest sample size and in the shortest time.