



Stimulating Innovation for
Global Monitoring of Agriculture





Yield Measurement Protocol

Tuy Province – Burkina Faso

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Yield Measurement Protocol for Burkina Faso study area

1. Objective

The present document describes how yield was measured in the ~150 maize, sorghum and millet plots followed in the Burkina Faso study area in 2014, 2015, and planned for 2016. After a short description of the study area (2), we present the field measurement protocol (3), how yield was obtained from the measurements (4), and in what format the data are made available (5).

2. Study area

Figure 1: Map showing location of villages surveyed and plots where yields were measured in 2014, 2015

The study area is the Tuy Province (approximately 6000 km²) located in the cotton region of West-Burkina Faso. The landscape is a plateau of about 300 m above sea level, with a few isolated hills of 570 m maximum height, separated by plains. The most common soil type is ferruginous tropical. The climate type is Sudanian with a rainfall of 800 to 1100 mm per year. Inter-annual rainfall variability is high, which strongly affects yields in a predominantly rainfed agriculture. The rainfall spatial variability is also important.

The land cover is composed of cultivated plots and some degraded savannahs, with a large area in reserve forests in the southern part of the province. The main crops are maize, cotton, sorghum and millet. Each year in 2014 and 2015, about 150 plots were followed (red dots in Figure 1). Most of them were in maize and sorghum.

The study area is also a JECAM site, and more information is available here:

<http://www.jecam.org/?/project-overview/burkina-faso-koumbia>

3. Measurement Protocol

Ground measurements and plot monitoring were organized per village. Five villages were surveyed: Koumbia, Gombeledougou, Dimikuy, Boni and Founzan, with around 30 agricultural plots per village. The larger Koumbia village was divided in two: Koumbia-Bwaba and Koumbia-Mossi which correspond to two ethnic groups.

For each agricultural plot followed, three survey plots of about 5 m x 5 m, using four wooden posts each, are installed during mid-season. They are chosen randomly within the agricultural plot, with each survey plot containing five lines times five bunches (poquets) of the crop each. Figure 2 gives a schematic representation of a survey plot. Green circles are crop bunches, brown squares are wooden posts, and in blue, is the quadrilateral and one of its diagonal to delineate the survey plot.

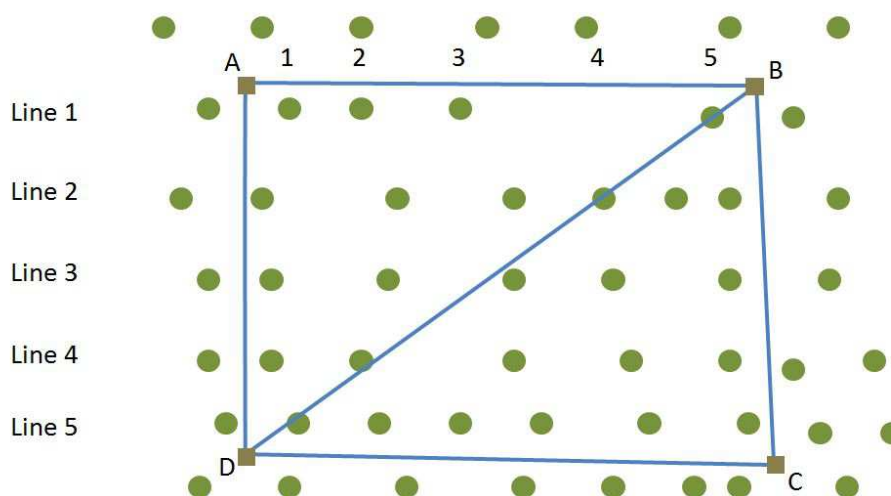


Figure 2: Definition of a survey plot (5 lines x 5 bunches).
The five quadrilateral lengths are measured: AB, BC, CD, DA, and DB.

On harvest day, the following actions are carried out for each of the three survey plots:

- Count the number of bunches (e.g. 26 in Figure 2)
- Count the number of ears
- Weigh separately (shoots + leaves) and ears
- Keep a sample of shoots and leaves for % dry matter estimation (%DM)
- Put the ears, shoots and leaves to sundry during at least 2 weeks

When the ears are dry, the grains of all the ears of a survey plot are removed and weighed.

NB: Please note that at harvest date, very often, the plants have already lost many leaves which fall to the ground. These leaves are not considered in the aboveground biomass measurements. The latter are thus underestimated, and the Harvest index overestimated.

4. Calculations

The yields for grain and biomass are calculated from the measurements using the following equations:

Grain Yield (in kg/ha) =

Above ground Biomass (in kg DM/ha) =

The surface area of the survey plot is calculated from the lengths measured AB, BC, CD, DA, and DB using simple geometric principles.

5. Data format

The grain yield and biomass data obtained have been put as attribute data in a Shapefile containing the location of the ~150 plots surveyed. Other useful attribute data, including sowing and harvest dates, obtained from the plot monitoring survey, have also been added. The attribute names used are explained below:

- 2014_PlotN : Plot Number in 2014
- 2014_SowD : Sowing date
- 2014_HrvD : Harvest date
- 2014_Ykg_ha : Yield (kg/ha)
- 2014_AeBm : Above ground Biomass (kg/ha)
- 2014_HvIn : Harvest Index (Yield / Above ground Biomass)
- -999 or -99 : unavailable, after error screening.

For 2015, the point locations of the plots are sometimes slightly different. Because of crop rotation, some plots followed in 2014 were cultivated with cotton in 2015. In that case, another neighbouring plot with maize, sorghum or millet was chosen instead.