

# Planting and replanting techniques among Ivorian cocoa smallholders

O. Dehevels<sup>1</sup>, A.A. Assiri<sup>2</sup>, A. Flori<sup>1</sup>, P. Petithuguenin<sup>1</sup>, B.I. Kebe<sup>2</sup>

1. CIRAD-CP, TA 80/PS3, Bd de la Lironde, 34398 Montpellier Cedex 5, France

2. CNRA, DReg Gagnoa, BP 602, Gagnoa, Ivory Coast

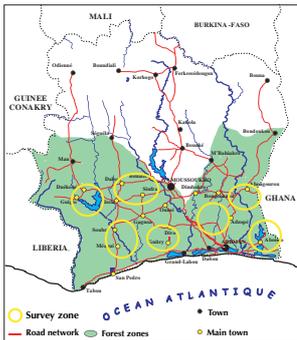


Figure 1. Map of the survey zones.

**T**he rise in Ivorian cocoa production has resulted from an increase in cultivated areas through plantations set up on cleared forest land. These planting dynamics have enabled the country to maintain its position as the world's leading producer for the last quarter of a century. Today, the exhaustion of Ivorian forest reserves raises the question of an alternative to these slash and burn systems. With a view to proposing sustainable and competitive alternative farming systems to extensions on cleared forest, a census of smallholder planting techniques on different previous plant covers has been carried out under an action-research project being jointly implemented by CNRA and CIRAD. The aim was first of all to describe and understand these techniques, and then validate the most promising ones.

## Material and methods

Between September 2002 and May 2003, more than 550 cocoa planting and replanting plots were surveyed in seven sectors representative of the main cocoa growing areas in the country (Fig. 1). The surveyed plots were under 5 years old. Interviews were conducted by trained and qualified interviewers. The data gathered involved:

- a description of the farmer (location, age, ethnic group, origin, level of education, experience),
- a description of the planted or replanted plot (area, age, previous crop cover, border plots, topographical aspects),
- factors determining the choice of land and crop management sequence (CMS),
- a description of the crop management sequences (planting material, propagation method, land preparation, planting design, upkeep methods), and the constraints of the CMS practised.

Distribution according to CMS category was linked to the region, the previous crop cover, the level of education and the origin of the farmers ( $\chi^2$  test,  $p < 0.05$ ).

- Categories (A) and (B) corresponded to plantings using seedlings at densities under 3,200 plants/ha in a row design (A) or random design (B). These CMS were linked to previous fallow or food crop cover and were specific to the Marahoué region. They were CMS practised by farmers who were 60% literate and not much practised by immigrant populations (15%). CMS (A) was primarily practised by the most experienced farmers.
- Categories (C) and (D) corresponded to plantings by direct sowing in a random design and at densities below (C) or over (D) 3,250 plants/ha. These CMS were linked to previous forest, cocoa or coffee cover and were specific to the Abengourou and Gagnoa regions (C) and to the Aboisso region (D). These were CMS that were relatively more practised by immigrant populations (30%) and by less literate populations (50%). CMS (C) was used to set up plots on a wide range of areas. CMS (D) was associated with planted shade, mostly in former cocoa plantings.

## Results

A Multiple Correspondence Analysis (MCA) carried out on all the variables showed that the plots were mainly structured according to the survey regions (Figure 2). In order to obtain a typology of smallholder crop management sequences and identify categories corresponding to combinations of the majority practices, an MCA was carried out (Fig. 3) on the 5 variables describing the replanting CMS observed :

- type of planting material used (seedlings or seeds),
- planting density (4 categories ranging from 300 to 24,000 plants/ha),
- type of shade (residual, planted, regrowth, no shade)
- the month replanting was started (February to November),
- the planting design (rows or random).

Axis 2 reveals the difference in planting period depending on whether the plants came from polybags (April to August) or were planted out in soil (June to August).

Four majority CMS categories were revealed on axis 1 (Fig. 4).

These categories were described by 3 variables: type of planting material, planting density and planting design. Variables such as type of shade and start of planting month were independent.

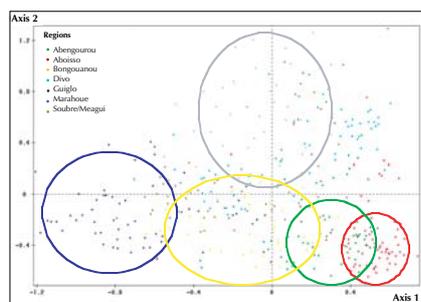


Figure 2. MCA on all the variables surveyed.

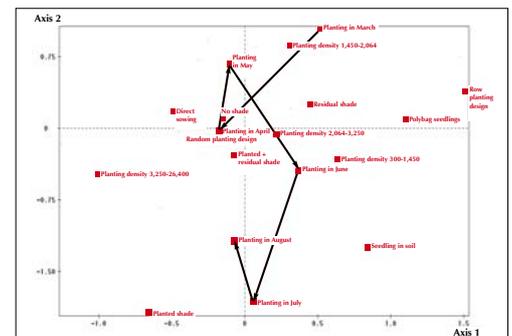


Figure 3. MCA on the 5 descriptive variables for the crop management sequences (modalities < 2% not kept).

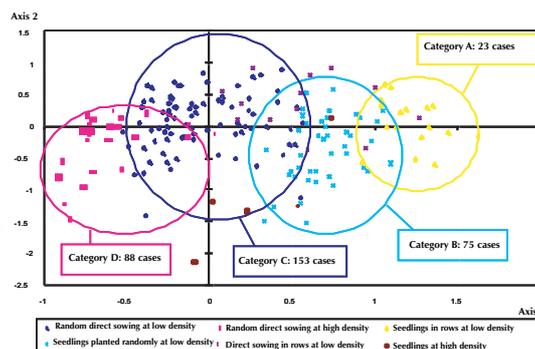


Figure 4. Detection of 4 categories of majority CMS variables (modalities < 2% not kept).

## Conclusion

A distinction could be made between the crop management sequences identified depending on the region involved, the previous crop cover, the level of education, and the origin of the farmers. These particular aspects will have to be taken into account in the subsequent stages of technique dissemination. An understanding of this smallholder crop management sequence typology in Ivorian plantings/replantings will enable us to undertake a comparative study and validate the most efficient ones.