Performance of various cocoa varieties in estates in São Tomé

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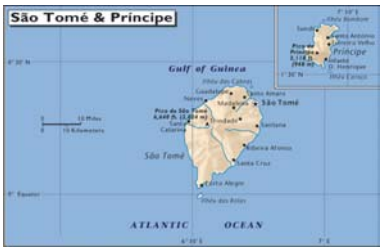

São Tomé and Principe is a small state in which a third of the land area is occupied by cocoa plantations. Exports stand at around 4,000 tonnes, half of which comes from large estates under private management. Among these, the Socatomé company launched a 4-year study in 1995 with support from CIAT to identify the main factors responsible for the low yields obtained.

Study design

Several cocoa varieties from seed gardens in various countries (Brazil, Côte d'Ivoire, Cameroon, Gabon, Nigeria, São Tomé) were planted over an area of 2,500 ha in varied environments, though generally under managed forest. The study was conducted at a sample of 28 sites divided into 2 groups of plots that were representative of the diversity of the planting material and of the environment:

- ***Production blocks*** for which the areas varied from 2 to 27 hectares.
- ***Control plots***: small plots (from 700 to 1,100 m^2) containing 100 trees chosen from inside the **production blocks**.

In both cases, routine upkeep (weeding, sucker removal, phytosanitary treatments) were carried out at the same frequency. Additional and systematic records were kept of the main damage occurring in the ***control*** plots.

Results and discussion

All the production blocks displayed uniform average yields from one year to the next (figure 1). The representativeness of the ***control*** plots was acceptable. The performance of the varieties from the different countries varied and loss percentages remained high: 31 to 42% (figure 2). These losses, of various origins, were mainly caused by pod rot (figure 3).

Figure 1. Yield trends depending on the crop management sequence applied.

Among these different origins, two groups could be distinguished. The first contained the varieties from Gabon, Cameroon and São Tomé (CIAT), which adapted well, with no major disruption to growth and flowering rhythms. The highest yields and the highest pod losses were found in this group. The second group mainly contained the varieties from Côte d'Ivoire and Nigeria, for which regular inspections in the field clearly revealed poor to nonexistent flowering, irrespective of the time of year, and even when vegetative development was substantial, as was the case for the Ivorian varieties.

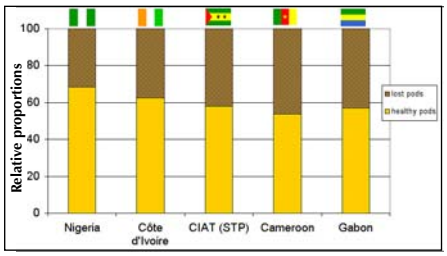

Figure 2. Relative proportions of healthy pods and lost pods depending on the country of seed origin.

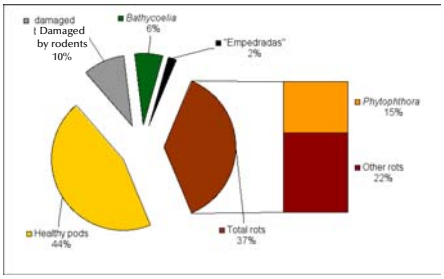

Figure 3. Distribution of healthy and lost pod production depending on their origin.

Of the indicators studied, the number of pods per tree (figure 4) most effectively reflected the differences in yields observed (figure 5). The good performance of the planting material from Gabon was particularly noteworthy.

The weight of fresh beans per pod (figure 6) and the average pod weight (figure 7) did not reveal any major differences between the origins.

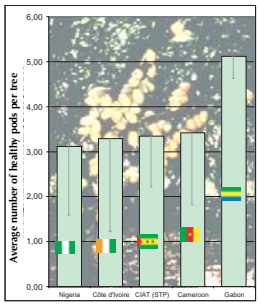

Figure 4. Average number of healthy pods per tree depending on the country of seed origin.

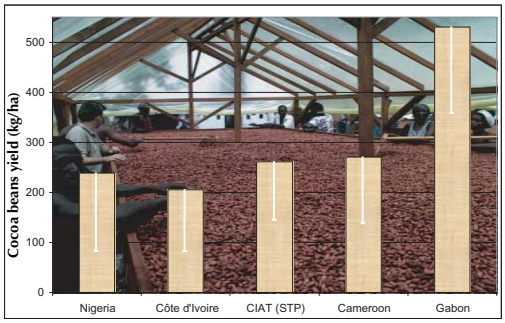

Figure 5. Comparative hybrid yields depending on the country of seed origin.

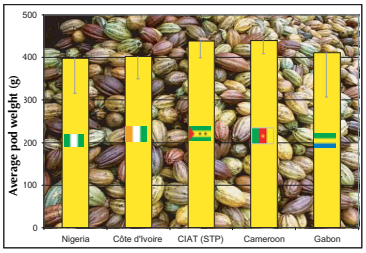

Figure 6. Average pod weight depending on the country of seed origin.

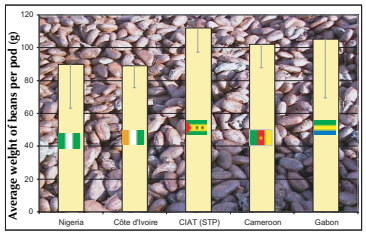

Figure 7. Average weight of beans per pod depending on the country of seed origin.

Conclusion

The cocoa varieties studied displayed varying abilities of adaptation to the soil and climatic conditions in São Tomé. Under these conditions, the number of pods per tree was the most relevant indicator of differences in yield. A gain in productivity seems possible by changing work calendars and frequencies, notably to improve the effectiveness of phytosanitary treatments with a view to reducing the abundant losses. New crop management sequences proposed in the light of these results are currently being assessed.

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Centre de coopération internationale en recherche agronomique pour le développement

Design and production: CIRAD-DIC, October 2003