

Comparative performance of two crop management sequences in a cocoa estate in São Tomé

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The State of São Tomé and Príncipe derives a large share of its export earnings from cocoa. Current production does not exceed 4,000 t. Since 1999, following a land redistribution programme, cocoa production has been ensured by smallholders, medium-sized farms, and 6 large agricultural enterprises under private management. Of these, the SOCATOMÉ agricultural company occupies a total area of 2,500 ha. In order to compensate for the low yields observed, it was decided in collaboration with CIAT to carry out a comparison of two crop management sequences between 1997 and 1999.

Material and methods

The hybrid planting material used was grown from seeds from different countries: Côte d'Ivoire, Cameroon, Gabon, Nigeria and São Tomé. Twenty-eight sites were chosen within the estate. At each of the sites, 2 types of plots were compared over 3 consecutive years.

- ✓ **Control plots** in which routine upkeep (weeding, sucker removal, phytosanitary treatments) was carried out at the same rhythm as defined for all the company's bearing plots.
- ✓ **Garden type plots** in which a particular intensive crop management sequence was applied. It involved applying a set of agronomic and phytosanitary results achieved by cocoa research. In both cases, pods were harvested each month, weighed and opened. All losses were identified. They were mostly caused by *Phytophthora* spp., *Selenothrips rubrocinctus*, *Bathycoelia thalassina* and rodents.

Table 1. Frequency of treatments carried out in the control and seed garden plots.

Crops management sequence	Plot weeding	Sucker removal, pruning	Circle weeding (1)	Fungicide treatment (2)	Insecticide treatment
Control	2 to 3/year	2 per year	2 to 3/year	3 to 4/year	On request
Garden type	2 per year	6 times/year	2 per month	6 to 8/year	6 per year

- (1) Cleaning around the foot of the cocoa tree.
(2) Only in wet periods

Results

The results revealed a significant improvement in dry cocoa yields per hectare when the garden type crop management sequence was used (figure 1). It should also be noted that the differences seen depended on seed origin.

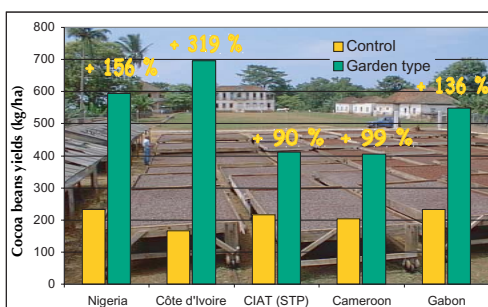


Figure 1. Effect of crop management sequence and seed origin on cocoa yields.

The phosphate fertilizer applied to correct the "absence" of flowering in the Ivorian hybrids led to a significant increase in the number of flowers then set fruits, thereby increasing yields highly significantly (+ 319%).

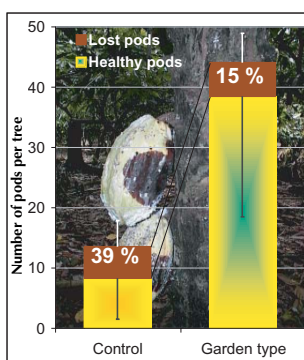


Figure 2. Effect of crop management sequence on the number of pods per tree.

The number of pods per tree was very significantly higher when the garden type crop management sequence was applied (figure 2), whereas the number of lost pods (rot, insect damage) was largely the same in both cases, with a much lower loss percentage in the case of the garden type plots: falling from 40 to 15%.

The crop management sequence did not affect pod weight. However, pod weight did vary highly significantly depending on the harvesting year (figure 3).

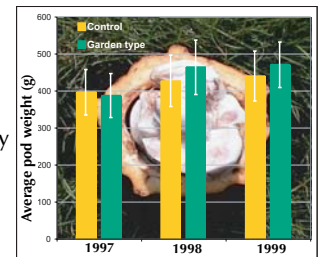


Figure 3. Effect of crop management sequence and harvesting year on the average pod weight.

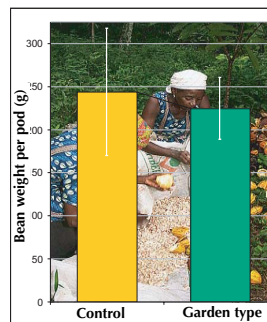


Figure 4. Effect of crop management sequence on bean weight per pod.

The bean weight per pod was significantly different depending on the crop management sequence applied (figure 4). The origin of the planting material and the year did not affect this parameter.

Conclusion

The differences found between the cocoa trees arose from different degrees of adaptation linked to an interaction between the environment in São Tomé and the origin of the seeds. The main consequence of the positive impact from applying the garden type crop management sequence, derived from an optimization of research results, was to reduce production losses due to *Phytophthora* spp. and to insect attacks. The increase in yields led to a rise in tree productivity, reflected in an increase in the number of pods. However, this phenomenon induced a drop in bean weight per pod. In economic terms, the cost of maintenance, upkeep and monitoring in the garden type plots amounted to 600 per hectare per year for significant but limited production gains. Cost-effectiveness was therefore not achieved between 1997 and 2000 due to low cocoa prices over that period. However, these results mean that simplified crop management sequences which are easier to implement (number and frequency), and which take economic reality more effectively into account, can be envisaged.



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