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Establishment of Coppicing Trials Involving Leucaena leucocephala and Cassia siamea Near Cap Haitien (Haiti)

By

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This report briefly outlines the ecological setting and the experimental design of two coppicing trials involving *Leucaena leucocephala* and *Cassia siamea*. The experiments were established as part of the silvicultural research carried out during the summer of 1985 within the context of the Agroforestry Outreach Research Project. These coppicing experiments are intended to generate valuable data on coppice regrowth for two tree species commonly used in agroforestry associations. In turn this data, will provide essential information for the application of silvicultural practices to maximize fuelwood production.

Environmental setting

The experiments were set up on two adjacent tree plantations near Cap Haitien. The plantations were established in October 1980 on alluvial soils, pockets of which are poorly drained and show obvious signs of salinization. Approximately two hectares were originally planted; presently about half that area is covered by a thick stand of *Leucaena* and *Cassia*. Plantation density is high with spacing between trees often less than 2 meters. Surprisingly, over the years the plantation has suffered few damages due to illegal cutting of trees.

The plantation extends north from a gravel road connecting Perdi Midi to Quartier Morin, 15 km south of Cap Haitien. Tree growth is optimal near the road where the soil is deeper and well drained. As the plantation nears the salt pockets about 200 meters north of the road, both tree height and DBH diminish gradually. The ground on and around the salt flats, is covered by bunch grasses and dispersed trees of *Haematoxylum campechianum* (campeche) and *Prosopis juliflora* (bayahonde).

The study site is located at sea level, in an area of relatively high rainfall (1,470 mm) comprised within the humid sub-tropical forest of the Holdridge (1963) Life Zone classification and zone 27 of the Buffum/Campbell (1984) classification. Soil pH ranges from about 7 near on the southern end of the plantation to 8 and 9 near the salt flats. Generally, the soil is light brown, very rich in clay and has poor drainage. Surrounding land is either planted with sugar cane or it has been in the past and is being resettled by "bayahonde" and "campeche" trees. Worth noting is a thick, nearly pure growth of *Haematoxylum* just to the west of the plantation.

No thinning, pruning or other silvicultural treatment has been applied to the plantation in the past. This coppice growth experiment represents the first intervention on the plantation since its establishment five years ago.

Experimental Design

The silvicultural treatment experiment involves two tree species: *Leucaena leucocephala* and *Cassia siamea*. The experiments were laid out along two parallel strips, 6 meters wide and more than 140 meters long. Each experimental plot measures 60 square meters. The length of each plot (10 meters) extends in a north-south direction. The width (6 meters) includes 3 rows of planted trees. Each plot has been separated by a similar size buffer plot (see Figure 1).

Between the two experimental strips there are at least four to five rows of trees of both species. For each experimental plot one seed tree was left standing, all other trees were measured for DBH, ground and base (10 cm) diameter and cut at 10 cm above ground. About one third of all trees cut were measured for total length. All trees were measured starting from the southeastern corner of the plot and proceeding along one row and returning along the adjacent one.

Diameter distribution of the trees in the experimental plots is presented in Figure 2 (*Cassia siamea*) and Figure 3 (*Leucaena leucocephala*). Trees in the control plots were measured for DBH, ground and base (10 cm) diameters, flagged with yellow ribbon and left standing.

Objectives

The objectives of the silvicultural experiment are to:

a) assess the productivity of coppice growth relative to tree growth in a untreated stand of trees,

b) assess the relative productivity of different coppicing treatments (compared to each other) and

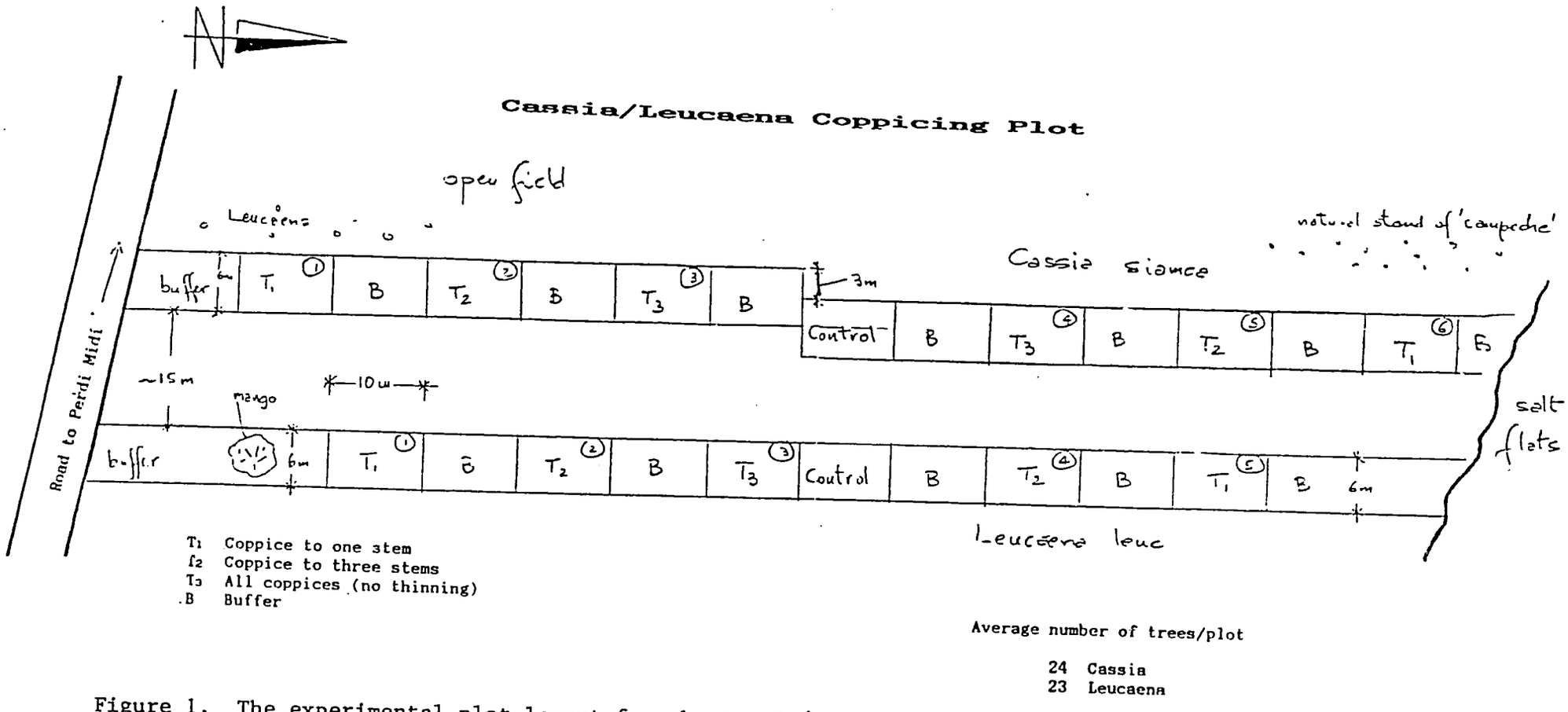

Figure 1. The experimental plot layout for the Cassia/Leucaena coppicing experiment near Perdi Midi, Haiti.

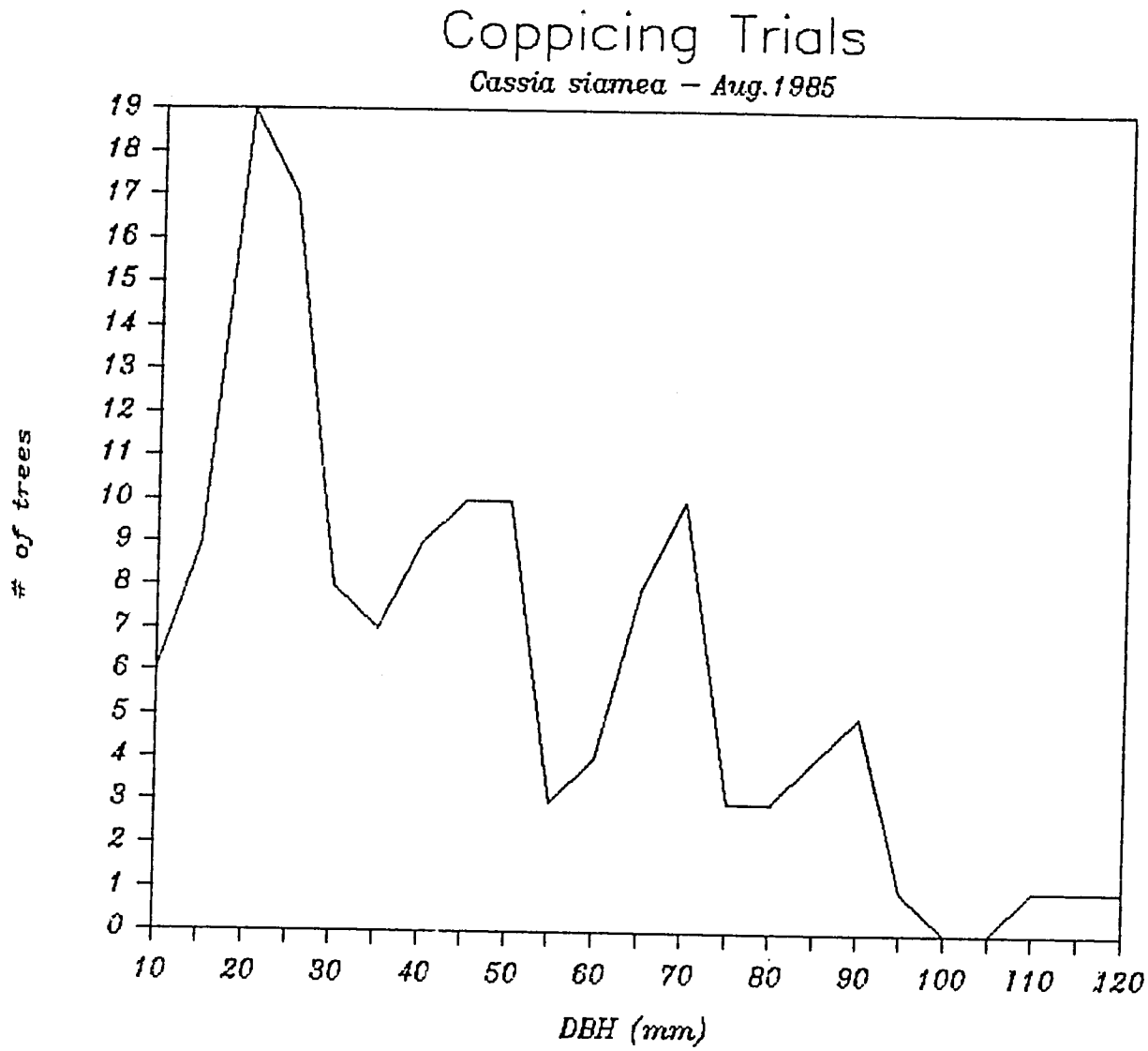

Figure 2. The diameter distribution of Cassia siamea trees harvested in the coppicing trials.

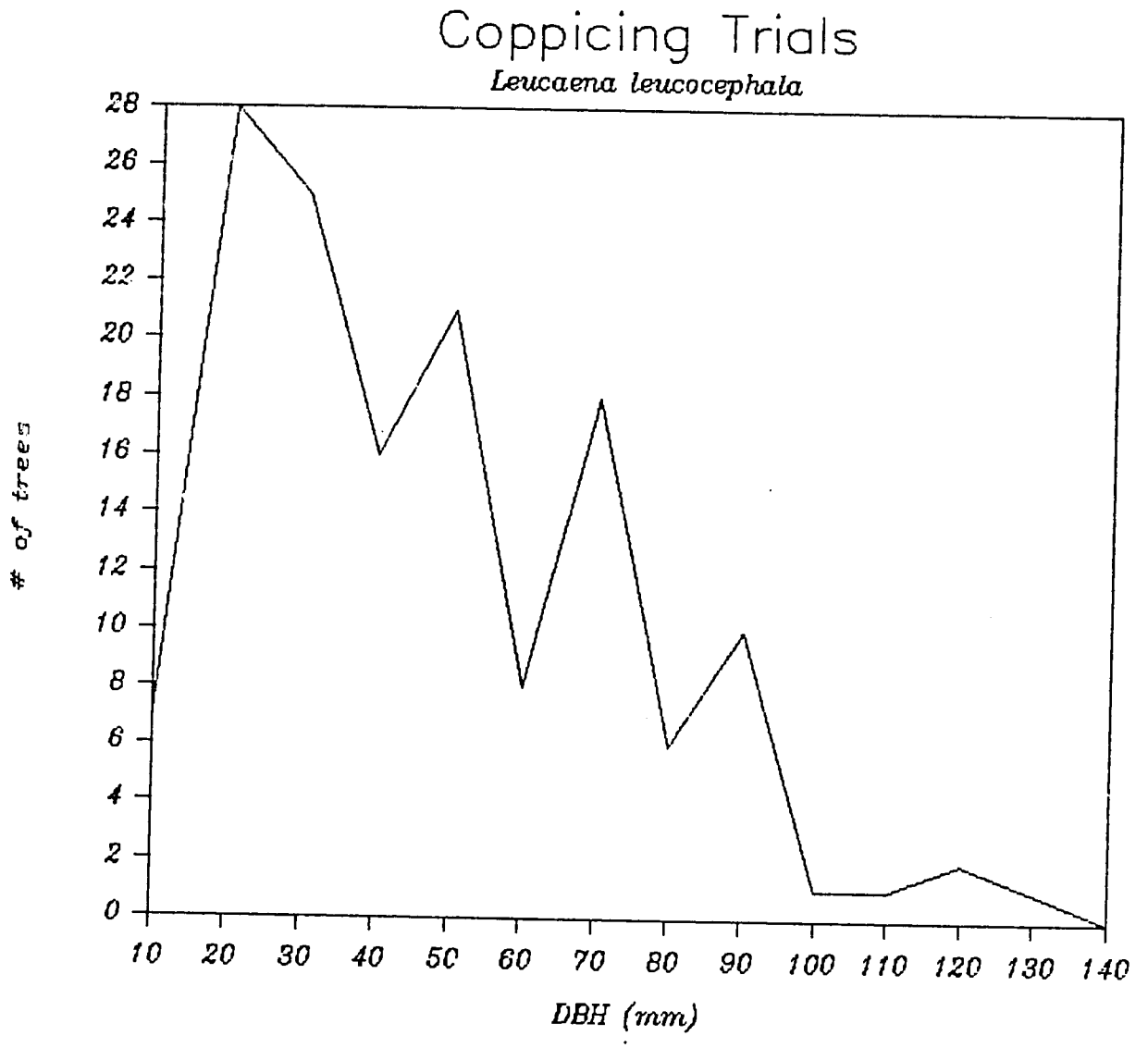

Figure 3. The diameter distribution of Leucaena leucocephala trees harvested in the coppicing trials.

c) assess the effect of coppice on the tree's overall performance as a producer of fuelwood over one or possibly, several coppicing cycles.

The experimental layout involves three treatments and three repetitions with one control plot as is shown in Figure 1. The treatments involved are:

1. Coppice to one stem (T1)
2. Coppice to three stems (T2)
3. All coppice (no thinning of coppice growth) (T3).

The 'no thinning' plot will be used as control plot to assess the performance of each coppice treatment relative to each other, while the plot measured, but not cut will be used to assess the productivity of cut trees (coppice growth) relative to those left standing. Each of the treatment plots as well as the control plots are replicated once along the experimental strip. The control plots are found at the center of the experimental strip, with the treatment plots replicated in inverse order on each side of the control plot (Figure 1).

Experimental Method

The experimental plots were measured and cut during the last days of August and the first days of September 1985, coinciding approximately with the beginning of the rainy season. The treatments will be applied after six months from this date (February 1986). At that time, the coppices will be thinned to

one, three or left growing. Coppices will be selected in terms of dominance, diameter, height and form. In the case of three sprouts, they will be evenly distributed around the stump and growing from near the base of the stump. The following measurements will be taken (at six months):

- total number of sprouts from each stump
- diameter (at DBH) of the coppices (sprouts) left
- height of the remaining sprouts
- DBH of trees in control plot
- DBH of seed tree within each treatment plot.

The following measures will be taken at 12 months from the date the trees were cut (September 1986):

- DBH of coppice growth in all treatment plots
- DBH of trees in control plots
- DBH of seed tree within each treatment plot.

Similar measurements will be taken at 18 months from the date the trees were cut (February 1987). At 24 months the coppices will be harvested and measured for DBH and total height. The duration of the coppice cycle depends upon the production objectives (i.e.,fuelwood, polewood) and the growth of coppices over time.

Conclusions and Recommendations

The coppicing trial is expected to provide essential information on the appropriate coppicing treatment to apply to tree plantations of *Leucaena leucocephala* and *Cassia siamea*.

The experiment will provide very valuable information on the productivity of coppicing for fuel or polewood production for the two tree species studied. Appropriate analysis of the results should establish whether or not coppicing increases yields of a stand of trees managed for a specific purpose (i.e.,fuelwood, stakes, poles).

The information acquired through this experiment will enable the elaboration of yield tables (fuelwood, poles) for coppices of the two tree species mentioned.

The treatments should be applied at 6 months from the date the trees were cut, when the coppices have clearly established dominance and the next rainy season is about to begin.

The length of the coppice cycle (24 months) should be leduced or increased as a function of specific production objectives (fuelwood, poles, lumber).

Results of these experiments should be properly documented and shared with research institutions (CATIE, ICRAF), as well as forestry practitioners in the region.

Similar coppicing experiments should be set up for other tree species commonly used in agroforestry applications in Haiti (i.e.,neem).