

Appendix H

Explore the impact of hevea as a non Si-accumulating plant

In order to explore the impact of a non Si-accumulating plant on the Si cycle in the soil-plant system, Nitisol under hevea were sampled in the Mungo area (Tombel site, TB, CDC rubber plantation, 291m altitude, 4.674246 latitude N, 9.637889 longitude E), very similar to Djungo soil (fully described in Chapter 3). The total analysis of the soil and the hevea litter SiO_2 content are presented in Table H.1.

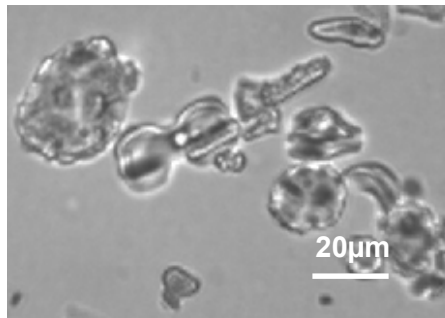


Figure H.1: Typical phytolith of grass from Tombel in the amorphous Si fraction (bilobate short cell) by optical microscopy.

The soil fractions were separated on two horizons (0-3 and 101-112) and isotopically characterized (Table H.2). The litter displayed a very light isotopic composition (Table H.2) but a soil contamination has to be feared regarding the SiO_2 content of the litter (Table H.1). A proper

Table H.1: Total elemental content in the Tombel soil (sampled with an auger), and Total Reserve in Bases (TRB).

TB		Al ₂ O ₃	CaO	Fe ₂ O ₃	K ₂ O	MgO	MnO	%			Na ₂ O	P ₂ O ₅	SiO ₂	TiO ₂	LOI	TRB
		cmol _c .kg ⁻¹														
TB	hevea litter	2.53														
TB	0-3	19.73	0.7	21.4	0.50	2.71	0.365	0.08	1.47	29.87	5.16	17.7	172.6			
TB	3-18	20.63	0.5	21.8	0.69	2.44	0.379	0.10	1.40	30.59	5.30	15.8	157.0			
TB	63-73	23.35	0.4	20.5	0.37	3.62	0.259	0.05	1.30	32.10	4.87	12.7	203.8			
TB	101-112	21.94	0.7	20.6	0.40	5.02	0.244	0.12	0.89	34.17	4.67	10.9	286.3			

Table H.2: Particle size distribution, and Si isotopic compositions ($\delta^{30}\text{Si}$ vs. NBS28, ‰) of hevea litter and soil fractions (sand, silt, clay untreated, ASi = Amorphous Si fraction).

	Particle % dw	$\delta^{30}\text{Si}$ ‰	$2\sigma_{\text{SD}}$ ‰
TB hevea litter	-	-1.54	0.11
TB 0-3 sand	6	-0.21	0.13
TB 0-3 silt	11	-0.73	0.15
TB 0-3 clay	80	-2.34	0.12
TB 101-112 clay	63	-2.84	0.11
TB 0-3 ASi	3.5	+0.39	0.10

disposal of litter traps to sample falling leaves and avoid contact with soil was not in place in this area. Soil isotopic compositions were lighter from primary (sand and silt) to secondary minerals (clay fractions) in good agreement with the measurements in similar soils (Chapter 12).

Amorphous Si (ASi) fraction displayed heavier isotopic composition despite the absence of banana plant. This site is characterized by a monoculture of hevea but observation by optical microscopy of ASi fraction revealed the presence of grass phytoliths (Figure H.1). This suggests that the herbaceous layer which is Si-accumulating might impact the soil-plant system, even in a monocultural system involving a non-Si-accumulating plant. This should be investigated in more details with a better control on the herbaceous layer.

