Growth and architecture modeling of yerba-mate cultivated in contrasting light environments using AMAPmod

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Yerba-mate is a dioecious, subtropical tree. Industrially processed leaves of this species are used to prepare a South-American tea. Two growth pauses regularly appear each year in yerba-mate grown in natural conditions, one in summer (total or partial), and second (total) in winter (Bazzo and Rakocevic, 2005). This species shows a combination of monopodial and pseudo-sympodial branching and extension. The few branches grouped around the dead apex, together with some extremely short internodes, mark the separation of each annual shoot into two successive growth units (Rakocevic *et al*., 2006).

This work, still in execution, aimed at understanding the growth patterns of primary shoots and branching in yerba-mate. Two independent experiments were conduced. In the first one, fifteen adult plants cultivated in each of two contrasted light environments (monoculture - MO and forest understorey - FUS) were marked. Metamer emission, leaflet-area expansion and internode elongation were observed during two years (period between two successive prunings) on three branches of each plant. The data set from a second experiment, conduced on one-year-old plants (Bazzo and Rakocevic, 2005), analyzed a branching pattern of yerba-mate.

Internode distribution and leaf survival are being studied on a growth unit level. The data are being analyzed using V-Plants software, successor of AMAPmod, freely available at http://www-sop.inria.fr/virtualplants/wiki/doku.php?id=software. To define the branching pattern on young yerba-mate by testing appropriate models in STAT module is being tried, while the existence of differences in growth patterns of primary shoots of adult plants grown in two light environments are being tested by histogram distribution. The structure constructed during a biennial period in two contrasted light environments also tended to explore the yerba-mate photomorphogenetic reactions and sex dimorphism (Rakocevic *et al*., 2006b).

Previous results indicated that growth flushes and pauses in the annual growing cycle of yerba-mate are controlled endogenously and modified by environmental factors (Rakocevic *et al*., 2006a), and it is expected that the actual architectural analysis throws a light on those controlling processes.

References:

Bazzo, K. C. de and Rakocevic, M. 2005. Periodicidade no crescimento vegetativo de *Ilex paraguariensis* (St. Hil) Aquifoliaceae. Série Documentos da Embrapa Florestas 117, CD-ROM.

Rakocevic, M., Medrado, M. J. S., Lucambio, F. and Valduga, T. A. 2006a. Shoot growing characterization in yerba-mate (*Ilex paraguariensis* St. Hil.) cultivated in two contrasting light environments. Proceedings of 4th South - American Congress in Yerba-Mate, November, 5th - 8th, 2006, Pousadas, Argentina, pp. 244-249.

Rakocevic, M., Medrado, M. J. S., Lucambio, F. and Valduga, T. A. 2006b. Ritmicidade de emissão e de queda de folhas e as suas conseqüências no manejo da erva-mate. Proceedings of 4th South - American Congress in Yerba-Mate, November, 5th - 8th, 2006, Pousadas, Argentina, pp. 250-256.