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VARIATION IN THE DEVELOPMENTAL FEATURES OF THE SECRETORY SYSTEM OF *COPAIFERA LANGSDORFFII* SEEDLINGS UNDER DIFFERENT LIGHT CONDITIONS

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Copaifera langsdorffii Desf. (Leguminosae-Caesalpinioideae) is a widespread tree species occurring in gallery forests, dry mesophitic forests and open and closed canopy savanna woodland [8]. The oil and oleoresin produced by this species is exhaustively exploited by cosmetic, pharmaceutical and other industries [4]. Some of the produced substances, mainly the terpenes, are the responsible for the resistance to microbial attack and protection against predators [5, 1].

The secretory system in *C. langsdorffii* is constituted by oil cavities and oleoresin canals showing a differential distribution in the stem: oil cavities are the most common secretory structure occurring in the cortex and oleoresin canals in the pith, in both seedlings and adult plants [7].

Feibert and Langenheim [2] reported that the oleoresin production in leaves of seedlings and young plants of *C. langsdorffii* differs in relation to the light intensity. So, seedlings under full light produce more resin comparing to those under shade conditions. However, despite of the evidences indicating that biotic and abiotic factors influence the resin production, experimental studies on developmental biology of the secretory system in *C. langsdorffii* are lacking.

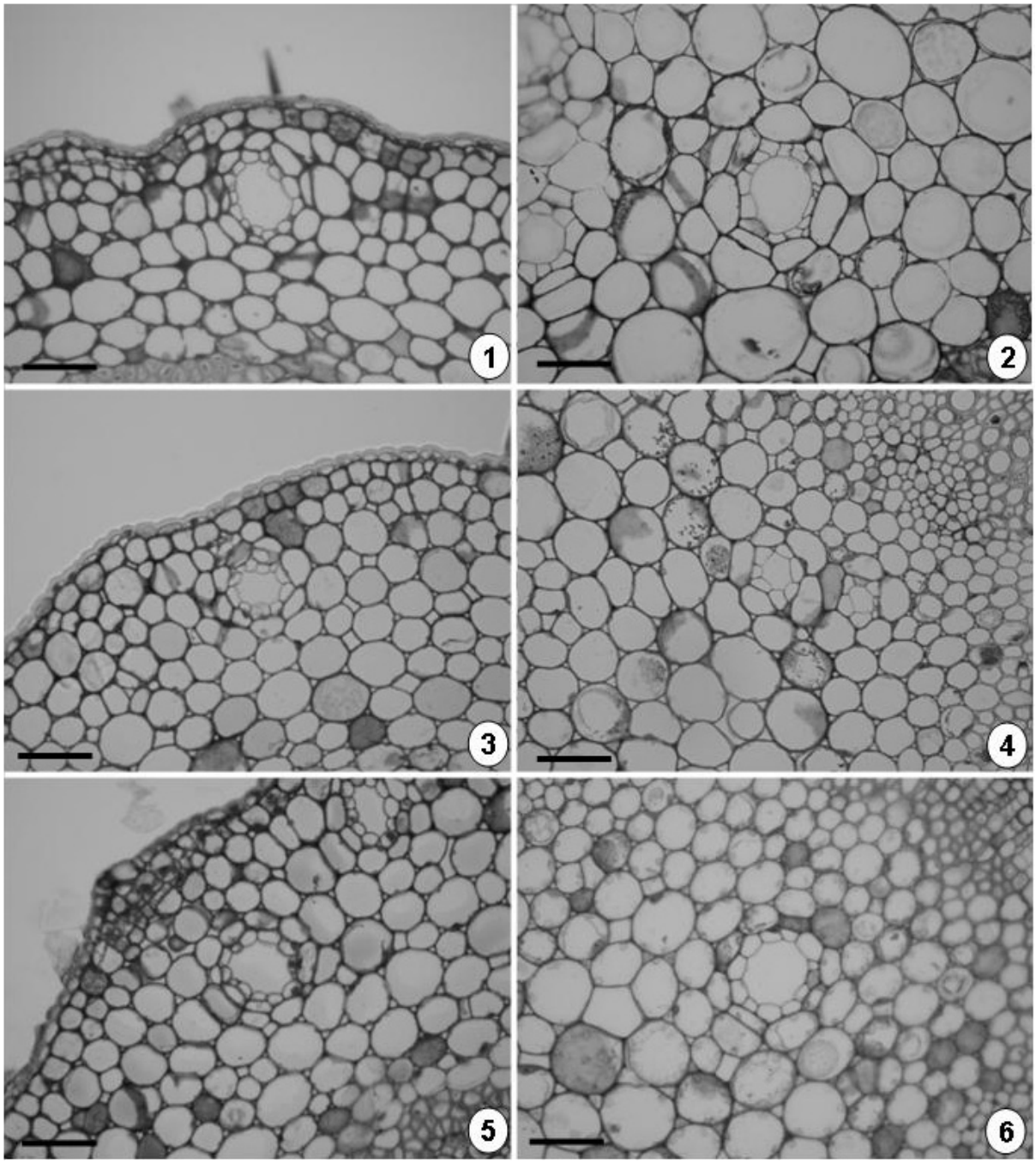
So, research in this area is of great importance to understand the structural and functional adjustment of the plants and to evaluate the light requirements for secretory system development. Here we test this idea employing seedlings of *C. langsdorffii* cultivated under three differential light conditions: 1) one group (n=10) of seedlings was maintained in climatic chamber at 25ºC and photoperiod of 12 hours of full light (2500 lux), 2) one group (n=10) under 50 % of light (1250 lux), 3) one group (n=10) under 90 % of shade (250 lux). When the aerial axis of the seedlings reached 5 cm of height, samples of the medial region of epicotyl were collected and handled following usual techniques in plant anatomy. We quantified the canals and cavities and measured their lumen diameter from cross sections using Cell B Olympus software.

Our experimental studies showed that the density and the diameter of lumen of secretory cavities and canals change in seedlings of *C. langsdorffii* growing under different light conditions (Table; Figures 1–6). Secretory cavities and canals answered differently to growing conditions. Oil cavities are more numerous in the cortex of seedlings growing under 50 % of shade while the largest number of oleoresin medullar canals was detected in full light condition. Concerning the size of the secretory structures, the widest lumen were observed in the cortical cavities of seedlings under full light and 90 % of shade and in the medullar canals of seedlings under full light.

Table. **Mean of cavity and canal number and lumen diameter in epicotyl of *C. langsdorffii* seedlings under different light conditions**

Light intensity	Cavities of the cortex		Canals of the pith	
	Number of cavities	Diameter of lumen	Number of canals	Diameter of lumen
Full light	11,6	29,2	9,2	36,6
50 % shade	17,5	23,97	6,0	21,2
90 % shade	12,2	29,2	5,5	33,7

Our data showed clearly that the light influences positively the development of the oleoresin canals in epicotyl pith of *C. langsdorffii* seedlings. However, the 50 % of shade condition induces the increase in the number of oil cavities and the decrease of the lumen diameter of in epicotyl cortex. This allows us to infer that seedlings of *C. langsdorffii* would have more developed secretory system in cerrado, an opened tropical savanna ecosystem where light is not limiting. Consequently, these plants could present an improved defensive system against herbivores and pathogens when compared to plants developed in the understory of closed-canopy, tropical forest, where the light is limiting. In the literature, some studies showed that both irradiance and herbivory enhance the leaf resin yields in seedlings of *C. langsdorffii* [2].



Figures 1-6. Photomicrographies of *C. langsdorffii* epicotyl in cross sections.

1, 3, 5: cortical region showing oil cavities. 2, 4, 5: medullar region showing oleoresin canals. 1, 2: full light; 3, 4: 50% of shade; 5, 6: 90% of shade. Bars = 50µm.

The light is one of the main environmental attributes affecting carbon gain and consequently the developmental, structural and functional traits of the secretory systems [6]. So, we suppose that the higher density of secretory canals in *C. langsdorffii* seedlings growing under full light, as compared to those under shade, resulted from an increased supply of the secondary products used in the formation of such structures, as suggested by Lin et al. [6] to resin canals in *Pinus sylvestris* needles. There are numerous reports about light-inducible secondary metabolism in higher plants [3], but very little is known about the shade or dark conditions influencing the secondary metabolism [9].

The differential answer by cortical cavities and medullar canals in seedlings of *C. langsdorffii* concerning the different light conditions is a remarkable result of this work. In this sense, we can suggest that the peculiarities observed can be related to the distinctive origin of these structures as notified by Rodrigues et al. [7] who postulated that cortical cavities arise from the fundamental meristem and pith canals arise from the rib meristem. **(Financial Support: FAPESP; CNPq; PROPE-UNESP)**.

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ANATOMY OF MAZUR-LIKE WOOD IN FINNISH CONIFERS

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Abstract. In this study abnormal structure of several wood specimens of Norway spruce, *Picea abies* (L) Karst., and Scots pine, *Pinus sylvestris* L., have been examined. These structures resemble to some extent the well-known mazur wood structure of Karelian birch (curly birch*), Betula pendula* Roth var. *carelica* (Mercklin) Hämet-Ahti. Both conifers with this kind of abnormal wood are very rare in Finland and their wood anatomy has never been studied in detail.

The mazur wood of birch is characterized by a flower- or star-like figure which appears mainly as a vague and modified version on the cross planes of spruce and pine trunks. The xylem of conifers exhibits indentations in the growth ring boundaries in varying number and size. Similarly to Karelian birch, the darkest flecks in the conifers contain tissue of bark. Spruce has parenchyma flecks with dark deposits/content resembling that of the birch.