DOI: 10.20396/revpibic2720192727

Structure and function of vegetative organs of Campylocentrum grisebachii Cogn.

Vinícius Saragiotto[1], Lais S. Sisti, Juliana L. S Mayer.

Abstract
Young stems and leaves are vegetative organs usually responsible for plant's photosynthesis. However, the absense of any of these shows an extreme adaptation in the living habit of this species. There are few studies with the seedlings development in species that show this kind of reduction. Campylocentrum grisebachii Cogn. is an orchid which in it's adult phase is leafless and only has a very condensed stem from where it's roots emerge. In this species, the roots are the organs responsible for the major photosyntesis production. This study proposes to understand the structure of the vegetative organs of C. grisebachii, starting with the apical meristems installation and the seedling development. Also, comparing the obtained results with the anatomical structures found in the adult plant, the insertion and role of the roots and how does the small stem structure develops and grows.

Key words: *Orchids, Roots, Anatomy.*

Introduction

The orchid *Campylocentrum grisebachii* has some characteristics that are not so usual among plants, that's one of the reasons it has been called a ghost orchid. With its extreme reduced stem, only visible in floral stalks during reproduction period, and leafless, all the photosynthesis used for plant survival comes from the roots, and eventually from its tiny green flowers[1]. It is a monopodial, epiphytic plant occurring over south and southeast Brazil[2]. This research focused in understanding the aspects of development of vegetative organs in seedlings and adult plants verifying the role, function and structure of the roots also describing them anatomically.

Results and Discussion

C. grisebachii seeds were collected and incubated in MS culture media (Murashige & Skoog) for the assimbiotic germination experiment. The protocorms collected were fixed for the preparation of optic microscopy slides. Portions of roots, stalks and flowers were included in historesin and optic microscope slides were produced for the study of the anatomical structures of this plant. As a result, the roots were confirmed to have the main photosynthetic role. The velamen is organized in 2 to 3 cell layers; epivelamen has larger cells compared to endovelamen smaller cells. The entire cortex is made of chlorophyll parenchyma, the chloroplasts are abundant in those cells, idioblasts containing raphide crystals are also present and spaces between cells are often recurrent. The endodermal cells are O-thickened, passage cells are opposed to stele's xylem poles that were alternated with phloem and all medullar cells are thickened.

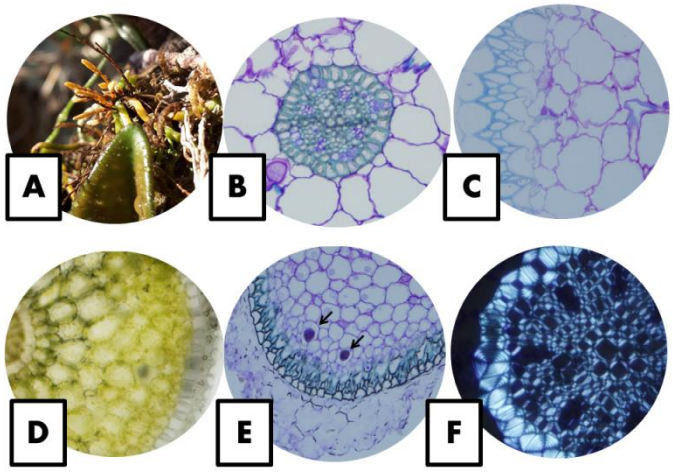

Figure 1: Examples of the anatomical characterization of C. grisebachii roots. A- Adult plant with its floral stalks emerging. B- Wide structure of root's stele in transversal cut (TC). C- TC showing details of velamen layers and spaces between cortical cells. D- CT of a fresh root showing the large amount of chloroplasts in cortical parenchyma cells E- Longitudinal cut from root's apex showing root cap. The arrows indicate idioblasts with raphide crystals. F- TC with polarized light showing details of endodermal cells O-thickened walls.

Conclusions

By the analysis of the laminarium the roots could be anatomically characterized. The assimbiotic germination was a success; the seeds rapidly turned green with the start of germination and protocorm formation. In this experiment they took some time to grow and in about four months these protocorms were elongating and after 60 days from that the first roots started to emerge.

---

[1] Hoang, et al. Comparative seed germination and seedling development of the ghost orchid, Dendrophylax lindenii (Orchidaceae), and molecular identification of its mycorrhizal fungus from South Florida, Annals of Botany 119: 379–393, 2017.
[2] Barros, et al. Orchidaceae in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. 2015.