**EPICUTICULAR WAX AND POLYMORPHISM OF CHLOROPLASTS IN *Gomphrena arborescens* L.f. (AMARANTHACEAE) LEAVES.** Suzane M. Fank-de-Carvalho(1), Dalva Graciano-Ribeiro(1). (1) Botanical Department, University of Brasília, P.O. Box 04.457, ZIP CODE 70910-970 Brasília-DF, Brazil. Email: suzifank@unb.br

Leaf sculptures aid high transpiration plants on light reflection and epidermis impermeability and to reduce water loss and fungi infections; when the epicuticular wax forms crystalloids, the form and distribution can be important to characterize the surface [1-2]. The $C_4$ pathway is highly dependent of the coordination between leaf structure and some of the ultrastructural characteristics has been associated to the photosynthesis $C_4$ pathway in Amaranthaceae family species, including some *Gomphrena* species [3-4-5]. *Gomphrena arborescens* L.f. leaves are dorsiventral and amphistomatic, present Kranz anatomy and concentrate starch in the complete bundle sheath cells [6]. Aiming to know the micromorphology and the ultrastructure of *Gomphrena arborescens* L.f., leaves of the species were collected in Brasília, Distrito Federal, Brazil, at the Olympical Center of the University of Brasília, in a cerrado *sensu stricto* area. The leaves of the 4º and 5º nodes were fractionated and submitted to the Karnovsky fixative [7] for 24 hours, post-fixated in $OsO_4$ + FCK (1:1 v/v) and treated as the protocol laboratory proceedings to be observed under the Scanning Electron Microscope JEOL JSM 840A (dehydrating, dissecation to the critical point and gold sputtering) and under the Transmission Electron Microscope MET JEOL JEM 1011 (dehydration, embedding on Spurr´s epoxi resin, ultramicrotomy and contrastation). The species presented epicuticular wax on both leaf faces, showing flat crystalloids of entire or irregular margins, arranged as parallel platelets, although this did not prevented fungi hyphae development on the epidermis (Fig. 1). Single rows of parallel platelets were observed, specially near the basal cell of the larger trichomes (Fig. 2). The larger trichomes presented warts and reticulated deposits of epicuticular wax. The chloroplasts of the mesophyll cells were in a peripheral position although the ones of the bundle sheath (or Kranz) cells were in a centripetal position. The chloroplasts of the mesophyll cells presented developed grana and few or absent starch granules (Fig. 3) while the ones of the Kranz cells had few lamellae development and great amount of starch granules (Fig. 4). In the Kranz cells, the chloroplasts presented a poor developed peripheral reticulum and a small increase in the mitochondrion number in relation to the mesophyll cells. The presence of epicuticular wax on *G. arborescens* leaves corroborates the phylogenetical alliance among Amaranthaceae and Chenopodiaceae [8-9]. The present work refuses the use of the epicuticular wax as a systematic value to separate Amaranthaceae and Chenopodiaceae on Centrospermales [10], where the authors considered that only the Chenopodiaceae presented small parallel platelets (less than 2 μm) of epicuticular wax, not restricted to the epidermal cells near of the stomata, while the Amaranthaceae did not presented any epicuticular wax. The ultrastructure of the chloroplasts in *G. arborescens* leaves indicates the occurrence of the $C_4$ pathway of photosynthesis [3-4-5]. However, the subtype and the rates of its operation still remains undetermined.

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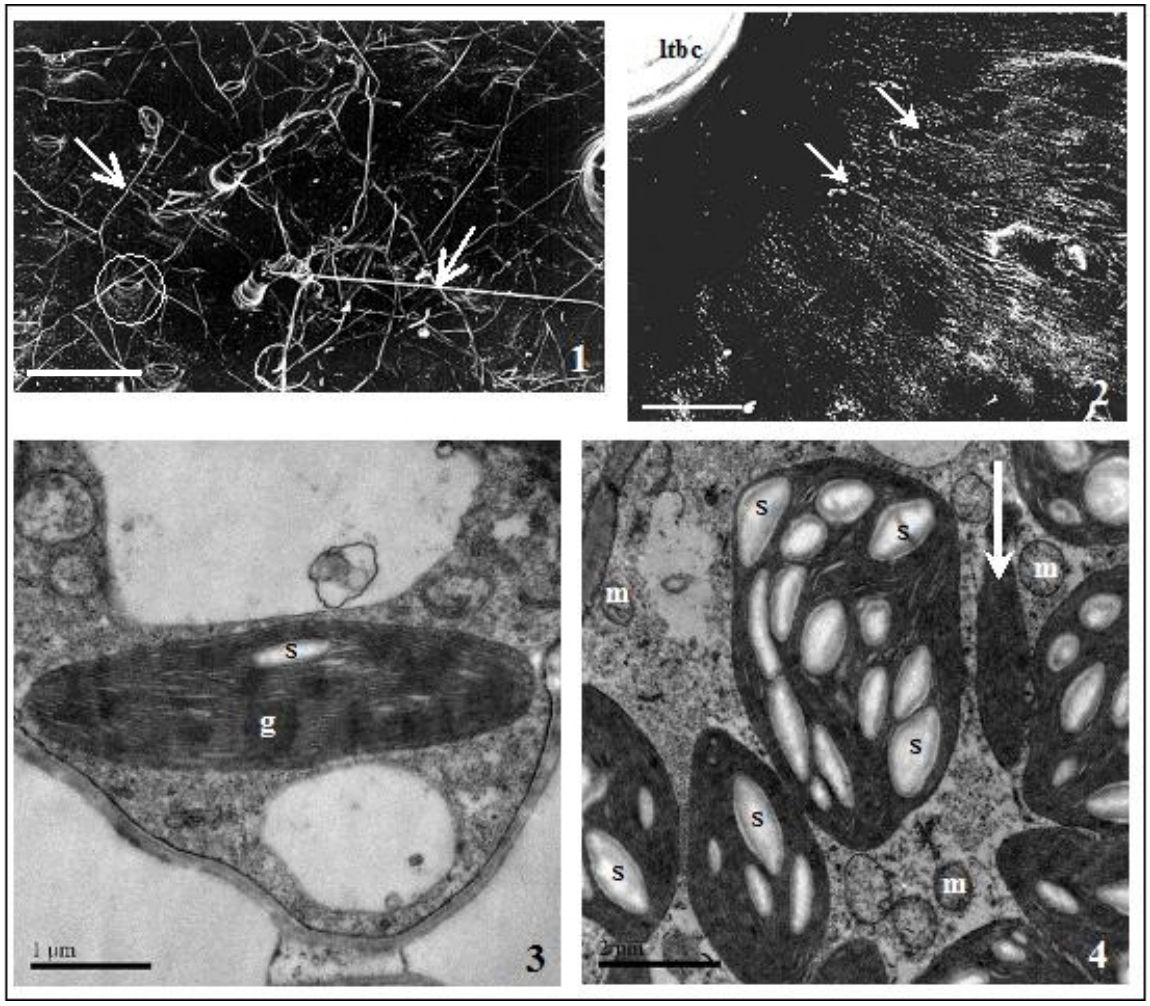


*Gomphrena arborescens* L.f. leaf under Scanning Electron Microcopy (1-2) and under Transmission Electron Microscopy (3-4)**. Fig. 1:** Fungi hyphae on the epidermis (**arrows**) and penetrating on stoma pore (**circle**). Barr = 100 µm. **Fig. 2**: Single rows of parallel platelets (**arrows**) irradiating from the large trichome base cell (**ltbc**). Barr = 50 µm. **Fig. 3:** Chloroplast of the palisade parenchyma cell near the bundle sheath, with well developed grana (**g**) and only one starch (**s**) granule. **4:** Bundle sheath chloroplasts, without starch (**arrow**) and changing shapes while the starch (**s**) is accumulating; mitochondrion (**m**) are increased in relation to the mesophyll cells.