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after sampling in both seasons and harvests, plants were stored in the dark in a cool, dry, and dark room. c. blanchetianus forms a gynoecium and a syncarpous one-seeded fruit 40 . the latter is formed by two valves, the upper one is known as the pilare, which consists of a single-layered endocarp, and the lower one is known as the pericarpium, which consists of a single-layered exocarp. the seeds were dried at 35°c, weighed, and subjected to extraction of their starch41. starch was quantified using the megazyme kit ( ). we evaluated the structural effects of water deficit by monitoring several plant parameters during the four samplings. the weight of the leaves was measured (see table 2) and the weight of detached leaves was calculated as an estimation of the weight of the leaves in the field. in 2015, we measured water potential (see table 3) using a scholander pressure chamber (model ppk 1, pms instruments, nieuwegein, the netherlands) at midday and during the night, in water-stressed plants (c. blanchetianus), and in well-watered plants (c. blanchetianus). we also used the non-destructive measurement of leaf conductance (see table 4) to evaluate stomatal conductance, the leaf-to-air vapor pressure difference, the evaporative demand, and the water-stress tolerance of c. blanchetianus. in 2016, we evaluated the photosynthetic rates using a li-6400xt portable photosynthesis system (li-cor biosciences, lincoln, nebraska, usa), the stomatal conductance using a sc-1 infrared gas analyser (irga, li-cor biosciences), and the leaf relative water content (lrc) using a sps4 scanning leaf-area meter (delta-t devices, cambridge, uk). photosynthetic response curves were performed at the end of the measurement period, using a dual-pam-100 (heinz-walz gmbh, effeltrich, germany), for measuring the leaf photosynthetic maximum (amax) and photosynthetic light-saturated (asat) photosynthetic rates (see table 5). photosynthetic response curves were performed using a light intensity series of 400, 200, 100, 50, 25, 12.5, and 6.25 µmol m-2 s-1, with 15 s exposure time per light level. we also evaluated water status and leaf water potential (see table 6).

the correlation analysis is a useful tool to understand the relationship between traits. our results showed that in the wet season, a reduction in midrib thickness led to a proportional decrease in xylem thickness in full-sun leaves. these results are in agreement with the high correlation among midrib thickness, leaf thickness, and xylem thickness in fully sun leaves at wet season (see r to f in table 2). in addition, at all four different seasons, we observed that the total xylem area of the midrib per area tended to be higher in natural shade leaves in comparison with full-sun leaves, which agrees with the corresponding higher midrib thickness of natural shade plants in this work. the vein density and the percentage of total vessel length per area were positively correlated with photosynthetic rates in both wet and dry seasons, agreeing with other studies 75, 76 . in the wet season, the variation of vein density and vessel length were better correlated with pn than at dry season. one of the most important factors related to plant efficiency is the ability to regulate water and co2 fluxes, and their relation to the sink-source balance 77, 78 . therefore, the ability of a plant to maintain water and co2 fluxes through the stomata and co2 diffusion is tightly related to the exchange of solutes in the photosynthetic pathway 79, 80 . for this reason, we investigated the stomatal and mesophyll conductances and the structural interrelation of both cell types. we also measured the leaf hydraulic conductance. stomatal conductance was positively correlated with photosynthetic rates (r = 0.55 to 0.85, p 5ec8ef588b