



LIVING PLANTS FUNCTIONS

GENERAL RECOMMENDATION

The captive environment should imitate and simulate the aspects of the natural environment meaningfully as close as possible.

THE MOST IMPORTANT RULE

Do not try to outsmart the Mother Nature. Try humbly copy what works for millions of years...

YOU CANNOT DO IT BETTER THAN MOTHER NATURE.

COMPROMISES

Must be meaningful and still keeping the character of the biotope in most and main aspects.

LIVING PLANT FUNCTIONS IN THE NATURAL ENVIRONMENT FOR THE BENEFIT OF CHAMELEONS

FIRST OF ALL

We must know what biotope is the species in question living in, so that we can meaningfully design the cage.

CLIMBING SURFACE PROVIDER

BENEFITS:

The branches and twigs of plants are the surface, on which the special chameleodactylous feet are safely gathering grip and provide safe touch-base for feeling safety and stable position in the environment.

RISKS:

Unsuitable climbing surfaces include:

- too smooth ones (like on palms or bamboo),
- too loose ones with bark and debris falling off (e.g. rotten decaying branches),
- those containing poisons (like the Ivy - *Hedera sp.*, causing skin burns and badly healing lesions),
- those containing sap that contaminates the soles that are then problematically shed or can even glue the animals to the branch (like conifers),
- those containing polymerizing sap on latex-basis (some fig-trees - *Ficus sp.*, spurge - *Euphorbiaceae*),
- those containing sharp microscopic fibers (like Bamboo) causing micro-injuries which get inflamed and attacked by fungal or bacterial infections.

SUPPORT BASE PROVIDER

BENEFITS:

The plants build solid and reliable support, safe to wear the weight of the body and withstand movements, wind etc.

RISKS:

Too thin, too fragile or unstable bases or swinging lianas are not preferred because being unsafe and because chameleon feet are not adapted to move on them.

SHELTER PROVIDER

BENEFITS:

The plants provide shelter against weather, especially wind and rain. Chameleons in general do not like heavily windy places and avoid vigorously the direct rain touch of their bodies.

RISKS:

Too open places expose them to rain and wind.

SHADE PROVIDER

BENEFITS:

Leaves and branches provide shelter against sun rays, in all the parts of the spectrum and protect them against overdoses of individual rays and enable thermoregulation.

RISKS:

Absence or insufficiency of shade exposes the chameleon bodies to:

- excessive UV, that damages cells and is carcinogenous,
- too bright light that can blind them,
- too high temperatures that influences destructively the function of many organs, especially the reproductive ones and speeds up the aging process.

HUMIDITY MODERATOR

BENEFITS:

Plants moderate the air humidity in the surrounding air in increasing it in general and enabling fog to form and persist and thus being available for fog hydration.

RISKS:

Absence of plants causes lower air humidity in general and risk of desiccation or insufficient hydration.

WATER BASE PROVIDER

BENEFITS:

Plants provide a big volume and surface of water to collect on leaves and branches and makes the liquid water available for drinking in the form of dew or water drops after mist or rain or after artificial misting. The prey gets moisture from eating the plants and drinking the water on leaves and stems too. Some chameleon species (e.g. Yemen and Arabian Chameleons - *Chamaeleo calyptratus*, *arabicus*) were speculated to gain moisture from eating leaves and berries, but it has not been proven so far whether they do it for this purpose.

RISKS:

Absence of living plants does not provide enough natural sources of liquid water to drink and leads to desiccation.

HUNTING SPACE PROVIDER

BENEFITS:

Plants provide various natural places for the prey to land, stay and hide and make itself available for chameleons to hunt, move towards the prey and naturally feed. Smell of fresh or decaying fruits, nectar and pollen and some saps attract mainly flying insect and pollinators to come and expose them to the chance of being eaten by chameleons.

RISKS:

No natural environment reduces the options to hunt, causes necessity to shoot for too far or at too big prey items and can cause injuries.

GASES MODERATOR

BENEFITS:

Plants provide very important gases: at daytime they expel O₂, a vital substance enabling breathing and essential for many physiological processes in organisms and at night they expel CO₂, a gas that slows down physiological processes and helps to relax and sleep having slight anesthetic properties.

RISKS:

Not enough O₂ lowers the activity, not enough CO₂ lowers the quality of sleep and relaxation.

LIGHTING MODERATOR

BENEFITS:

Plants grow and thrive only if there is enough light for their photosynthesis. So, automatically, when chameleons live on living plants, they adopt an environment, where enough light is present richly in all the natural parts of its spectrum, that are vital for plants and chameleons: IR (infra-red, heat for thermoregulation, heat gain from the rays), visible light (for photosynthesis in plants and vision in chameleons) and UV (as antibacterial and physiological processes moderator for both plants and chameleons), all that in various intensity due to shade provided by the leaves and branches, enabling chameleons to choose the proper place and regulate their exposure to it.

RISKS:

Not enough light is fatal both for the plants (not sufficient photosynthesis, therefore collapse of the physiology) as well as for the chameleons (no heat - no thermoregulation; no light - no hunting, no communication, no reproduction; no UV - illness, physiological disorders).

PREDATOR PROTECTION

BENEFITS:

Plants provide a hiding space and make it very hard to impossible for the predators to find chameleons. Defecating from high in the plants down to earth does not leave scent traces for the predators to find them. Living in a thorny, hard accessible, densely vegetated environments makes it hard for predators to hunt for them and living high in the trees enables chameleons to let them fall down and increase suddenly the distance to the predator significantly and escape.

RISKS:

Being exposed to environment without plants is stressful as no hiding is possible, chameleons feel insecure.

AIR FLOW MODERATOR

BENEFITS:

Plants slow down but foster at same time air flow through the canopies and provide protection to chameleons in sense of not being blown away by wind or blizzard and do not suffer from too intense air flow and heavy wind.

RISKS:

No protection can cause air streaming unfavorable for chameleons or too quick and intense wind that can harm or kill them.

NUTRITION SOURCE

BENEFITS:

Plants provide the nutrition to the feeders and provide them with gut-load (plant materials, juices, nectars, pollen) and polluting their bodies with dust and pollen that is then eaten and digested by chameleons.

RISKS:

Chameleons can get poisoned by animals that feed on poisonous plants, such as e.g. the Monarch butterfly - *Danaus plexippus* (its caterpillars feed on poisonous milkweed) or they can get constipated by feeding on some fibrous plant material like moss, lichen, Spanish moss - *Tillandsia usneoides* etc.). If eating too much sweet and sour plant material such as fruits, nectar etc., they can get acidosis and destroy their homeostasis. If eating plant material of poisonous plants directly, they can get poisoned either acutely (immediately, with quick appearance of effects like vomiting, losing consciousness, death) or (much more often) the effects are repeated, chronic and cumulative: nothing visible happens short term, but the negative effect gets accumulated in their organs (esp. liver) and once getting over the margin tolerated, the animals shows the symptoms and dies. Luckily, chameleons seem to be rather resistant to plant poisons (such as *Ficus benjamina* sap, poisons of *Sansevieria* sp. and *Eupremnum* etc.), the area is however not investigated properly yet.

ANTISEPTIC SPACE PROVIDER

BENEFITS:

Living plants - thanks to their complex anatomy and interaction with environment and antimicrobial and antifungal properties of their living parts - provide a space with limited ability of bacteria and fungi to survive, grow and reproduce.

RISKS:

No protection can cause bacteria and fungi growth and increase their concentration and subsequent infection of chameleons with sometimes lethal consequences.

DUST COLLECTOR

BENEFITS:

Leaves work like collectors of the everpresent dust, which is an important source of minerals, mainly Calcium, as CaCO_3 (limestone) comprises an important part of the dust volume. Licking leaves or feeding on dust-contaminated insects supplies important minerals.

RISKS:

Absence of plants can cause insufficiency in mineral supplementation.

DIGESTION AID SOURCE

BENEFITS:

Some chameleons (e.g. Yemen and Arabian Chameleons - *Chamaeleo calyptratus*, *Chamaeleo arabicus*) eat leaves to get indigestible fiber in order to better form the faeces and pass them through intestines.

RISKS:

Absence of plants can cause problems with digestion, vomiting or sepsis, intentional or incidental swallowing parts of fake plants leads to constipation and death.

ETHERS PROVIDER

BENEFITS:

Plants produce lots of ethers that interact with the organism that come in contact with them. Though an integral part of the environment, they are extremely poorly studied, but what we know for sure is: they are a natural part of the environment and some play important role in the prevention of bacterial and fungal diseases.

RISKS:

Absence of natural ethers may lead to increased risk of diseases, especially respiratory ones and especially those caused by bacteria and fungi.

MIMESIS BASE PROVIDER

BENEFITS:

Dwelling in the canopies and in the protection of plants for millions of years led to co-evolution of:

- structures of the bodies of chameleons imitating their surroundings (horns, scales, appendages, protuberances resembling twigs, lichens, leaves, grass)
- patterns on the bodies (stripes and patches being in accordance with grass, leaves, twigs, game of light and shade)
- typical movements of the environment (the leaf-walk, "pancaking" resembling a leaf in the wind) to make the chameleon invisible.

RISKS:

In an environment without plants, the chameleon becomes quite conspicuous and can draw attention, in too spiky environment, there is a certain risk of injuries by the sharp thorns if plants, especially if the trees are not indigenous to the very area the pertinent chameleon species inhabits (Like e.g. *Zyzypha* sp. in NW Madagascar, introduced recently, causing many bad injuries to the Panther Chameleons - *Furcifer pardalis* e.g. at Ambilobe).