Protocol appendix: Plant growth type and form

– by the COMPADRinos

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The COMPADRE Plant Matrix Database categorizes plants (and brown and red algae) into one of 11 "growth types". This document provides a brief overview of each of these types with an indication of what *Raunkiær Growth Form* (RGF hereafter) is likely to be represented.

Algae

Algae is an informal (i.e. not taxonomically accepted) term used to refer to a large, diverse group of eukaryotes of polyphyletic origin. These contain, among others, green, brown and red algae, names that are based on their pigmentation. Green algae are plants. Brown algae and red algae are not considered plants - but in COMPADRE we treat them as though they are due to convenience and because their demography is more similar to plants than to animals (COMADRE). Collectively, these species including basal unicellular organisms up to complex close relatives of higher plants. Reproduction can be sexual and/or asexual, and also it may involve alternating generations, with a sexual (gametophyte) and an asexual (sporophyte) part explicitly described of the life cycle. Algae live in marine and freshwater ecoregions.

- Not every plant living in water is an algae (higher plants living in water tend to be herbaceous perennials).
- RGF: Hydrophyte (buds below water).

Annual

These plants are called annuals because they complete their life cycle from germination, to growth, to reproduction and to death within a year or less. Exceptions are biennials and pseudoannuals (life cycle not completed within a year, but in less than two). Type of reproduction is both, sexual and asexual, but most frequently sexual.

- Often there is a seed bank stage in the matrices.
- RGF: Therophyte (buds belowground or at ground level, and lifespan < 1 year).

Bryophyte

Mosses are lower plants that expand horizontally, covering the ground or other plants (see below for RGF classification), as opposed to growing tall (e.g. like trees). Their reproduction includes

sexual and asexual reproduction, the latter one mostly via fragmentation of parts of the moss.

- RGF: Epiphyte when growing on top of another plant, Hemicryptophyte when growing at ground level.

Epiphyte

These plants do not typically use soil nutrients. Instead, the live on top of other plants and benefit from their host' height to access high humidity and light levels. They may uptake nutrients directly from the air moisture, deposition on branches, or from parasitizing their hosts. A distinction is made between higher plants and lower plants (e.g. lichens). They typically reproduce via sexual reproduction, but lower plants can also have asexual reproduction.

- Migration within population from one host tree to another is possible (e.g. *Heteropsis*)
- RGF: Epiphyte

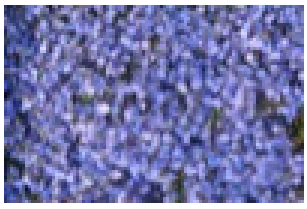
Fern

These basal vascular plants are also called pteridophytes. Their reproduction includes both sexual (gametophyte) and asexual stages (sporophyte).

- Asexual reproduction via spores not equal too seeds
- RGF: Hemicryptophyte (at ground level), Chamaephyte (0-0.25 m max height from ground), or Nanophanerophyte (0.25-8 m max height)

Herb

Herbaceous perennials are plant that do not produce woody tissue and live for more than two years. They can produce parts that persist close to or at ground level (like stems, rhizomes) after the growing season, while leaves etc. die. This class also includes bigger plants like banana (*Musa sp.*). Reproduction can include sexual and/or asexual, clonal reproduction can occur via stolons (=Ausläufer), among other types.



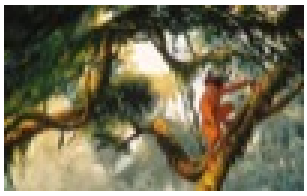
- Seed bank
- Underground parts for vegetative dormancy
- RGF: Hydrophyte (below water), Helophyte (in marshy grounds), Epiphyte (on top of other plants), Geophyte (underground), Hemicryptophyte (at ground level), Chamaephyte (0-0.25 m max height from ground)

Liana

Lianas are thin, woody plants with roots in the soil that use trees etc. to climb towards the light. This growth form is common in

tropical forests, where the light on the ground is reduced due to dense canopy of trees. Reproduction can be sexual and/or asexual.

- RGF: Nanophanerophyte (0.25-8 m max height), Mesophanerophyte (8-30 m max height), Megaphanerophyte (>30 m max height)



Palm

Palms are all members of one family (Arecaceae). They do not form real wood, unlike trees (below), because they do not form annual tree rings. They can reproduce via sexual and/or asexual reproduction.

- Mostly simple matrices
- RGF: Nanophanerophyte (0.25-8 m max height), Mesophanerophyte (8-30 m max height), Megaphanerophyte (>30 m max height)

Shrub

Shrubs are woody plants that are usually smaller than trees and have multiple stems. They can reproduce via sexual and/or asexual reproduction.

- Sometimes seed bank
- RGF: Chamaephyte, Nanophanaerophyte (0.25-8 m max height), Mesophanerophyte (8-30 m max height)

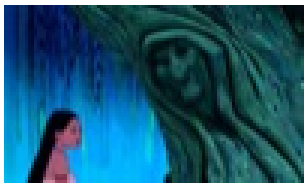
Succulent

Succulents like cacti, but also lots of other plants, store water in leaves and/or stems. They live in arid (e.g. deserts) or salty (e.g. coasts) regions. Reproduction can be sexual or asexual.

- RGF: Chamaephyte, Nanophanaerophyte (0.25-8 m max height), Mesophanerophyte (8-30 m max height)

Tree

Trees produce true wood, and tend to have a single stem (though exceptions clearly exist). Their range of distribution is delimited by the tree line - a spatial border due to a drastic change in temperature and humidity which is found e.g. in higher longitudes (Arctic) or elevations (alpine). They tend to reproduce mostly via sexual means, but asexual reproduction is also possible in some species.



- Mostly simple matrices
- DBH: Diameter at Brest Height usually for CriteriaSize
- RGF: Nanophanerophyte (0.25-8 m max height), Mesophanerophyte (8-30 m max height), Megaphanerophyte (>30 m max height)