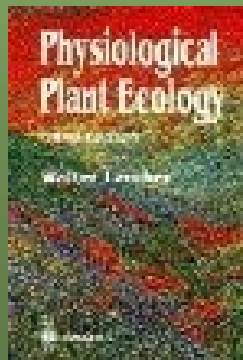
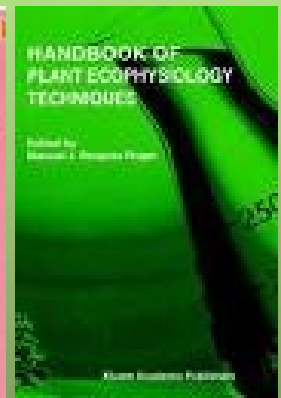
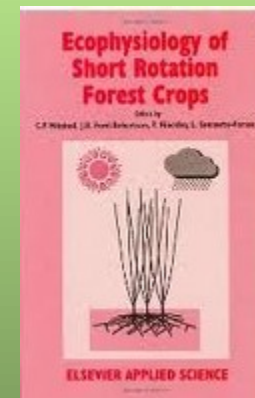


Ekologická fyziologie či fyziologická ekologie fotosyntézy

M. Barták, P. Sklenář



Bi 0007 Ekofyziologie fotosyntézy vyšších rostlin
Letní semestr 2015



CAM rostliny

- Efektivní hospodaření s vodou – výskyt v aridních oblastech, epifyty deštného lesa

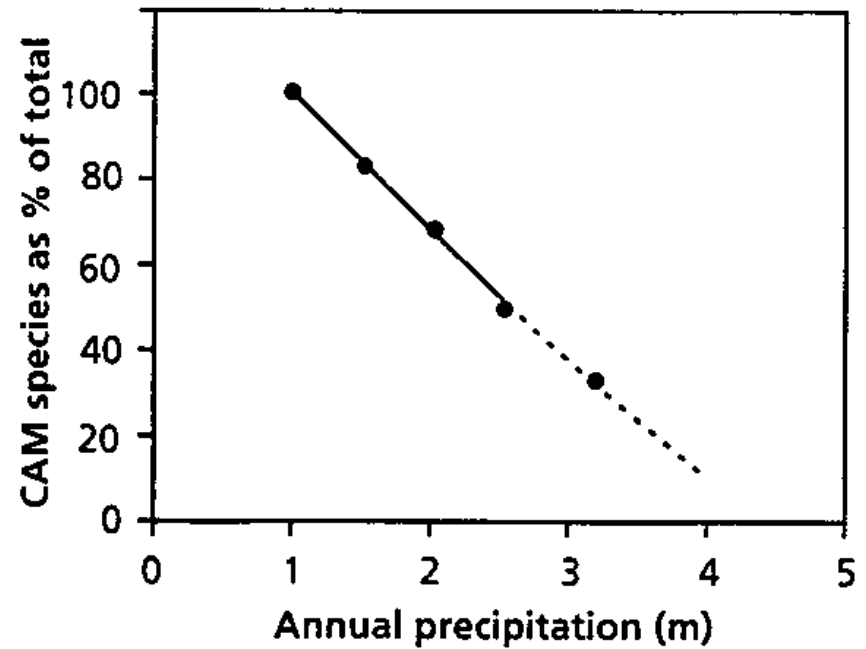


FIGURE 50. The relationship between percentage of epiphytic bromeliad species with CAM metabolism and mean annual rainfall in Trinidad (Winter & Smith 1996).

Transpirace

- Transpirační rychlost $Tr = \Delta c / \Sigma r$
- fotosyntéza a transpirace – *trade-off*
- *koeficient využití vody ve fotosyntéze* $WUE_{ph} = \text{fotosyntéza} / \text{transpirace}$ [$\mu\text{mol CO}_2 / \text{mmol H}_2\text{O}$]
- *transpirační koeficient* – množství vody v litrech potřebné k vyprodukování jednotky biomasy [l/kg], efektivita využití vody k růstu, $CAM > C4 > C3$

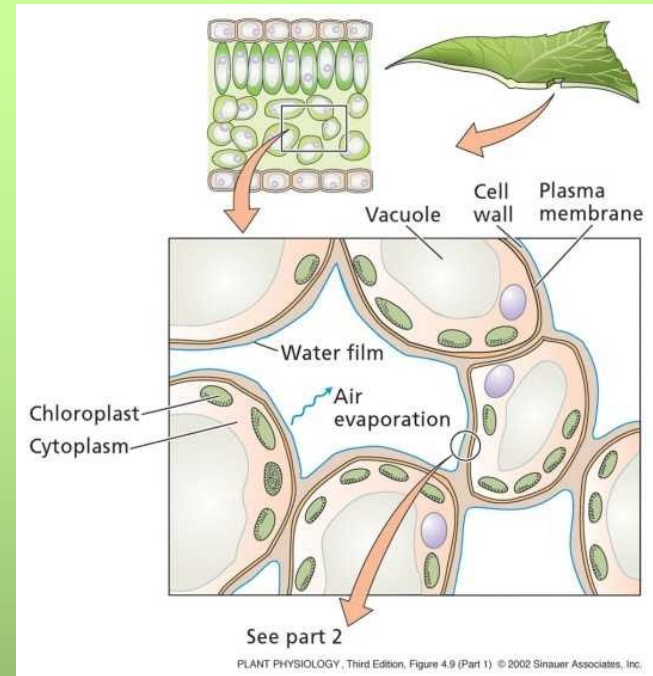


TABLE 8. The photosynthetic water-use efficiency of plants with different photosynthetic pathway* and belong to different functional groups.†

Functional type	Water-use efficiency (mmol mol^{-1})
CAM-plants	4–20
C_4 plants	4–12
Woody C_3 plants	2–11
Herbaceous C_3 plants	2–5
Hemiparasitic C_3 plants	0.3–2.5

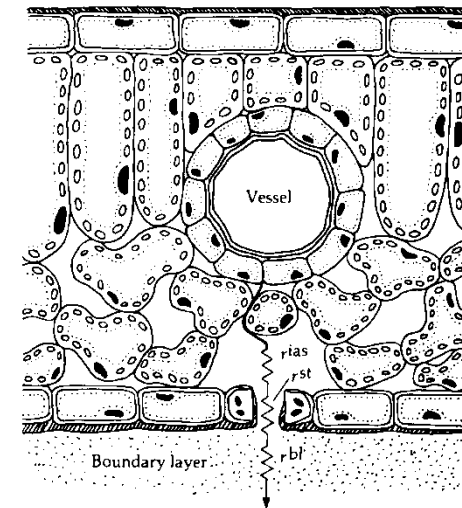


Figure 18-6 Cross section of a leaf showing the resistances associated with water loss. r^{ias} is the resistance to vapor movement in the substomatal cavity, r^{st} is the resistance offered by the stomatal pore and guard cells, and r^{bl} is the resistance offered by the boundary layer on the leaf surface.

Vodní bilance ekosystému

$$\Delta W = P - I - E_v - T_r - G_w - R$$

- srážky vertikální a horizontální
- **intercepce korunou**
- evaporace (výpar)
- **transpirace**
- průsak do podzemní vody
- odtok povrchový a podzemní

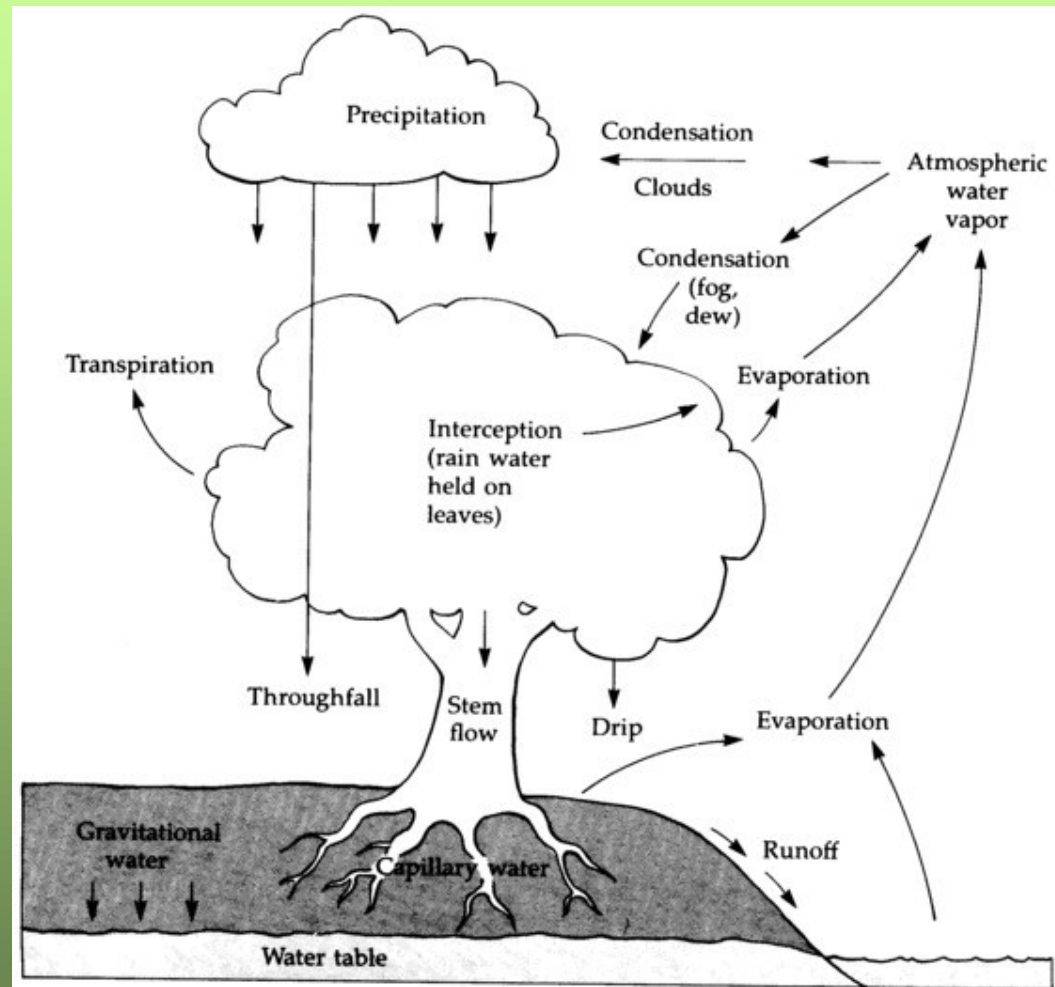


Figure 19-1 Schematic diagram of the hydrologic cycle, showing potential pathways of water flux in an ecosystem.

Intercepce srážek korunou

- Intercepce závisí na struktuře koruny a LAI – až 50% u smrku
- skropná voda (voda potřebná k navlhčení listů, 1–2 mm) → čisté srážky
- odtok po kmeni (*stemflow*) – ztráty většinou nevýznamné

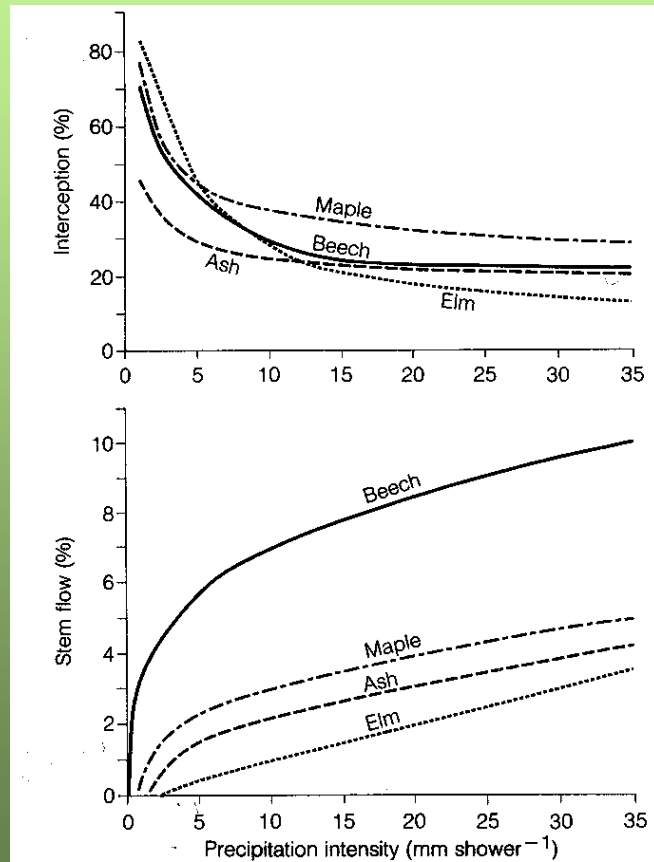
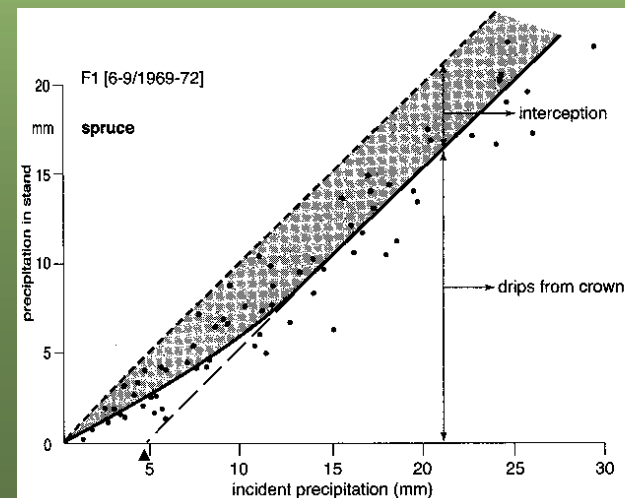
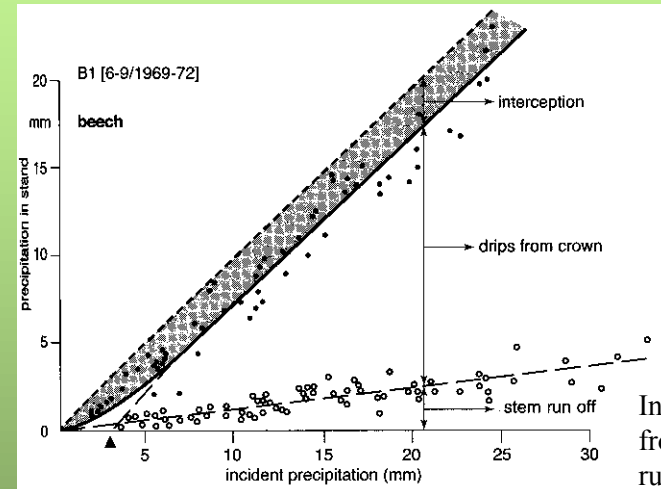


Figure 6.25 Percentage interception (upper) and percentage stem flow (lower) for selected hardwood species in relation to rainfall intensity. (After Kittredge, 1948.) (Reproduced from J. Kittredge, *Forest Influences*; published by McGraw-Hill Inc., 1948.)



Interception, drip from crown and stem runoff on stem during the months of full foliage for beech and Spruce depending on precipitation. For spruce, stem runoff is negligible.

Modifikace (meso)klimatu

- Změny ve struktuře krajiny → změny v energetické bilanci ekosystémů
 - tepelné záření, turbulentní toky (latentní a pocitové teplo)

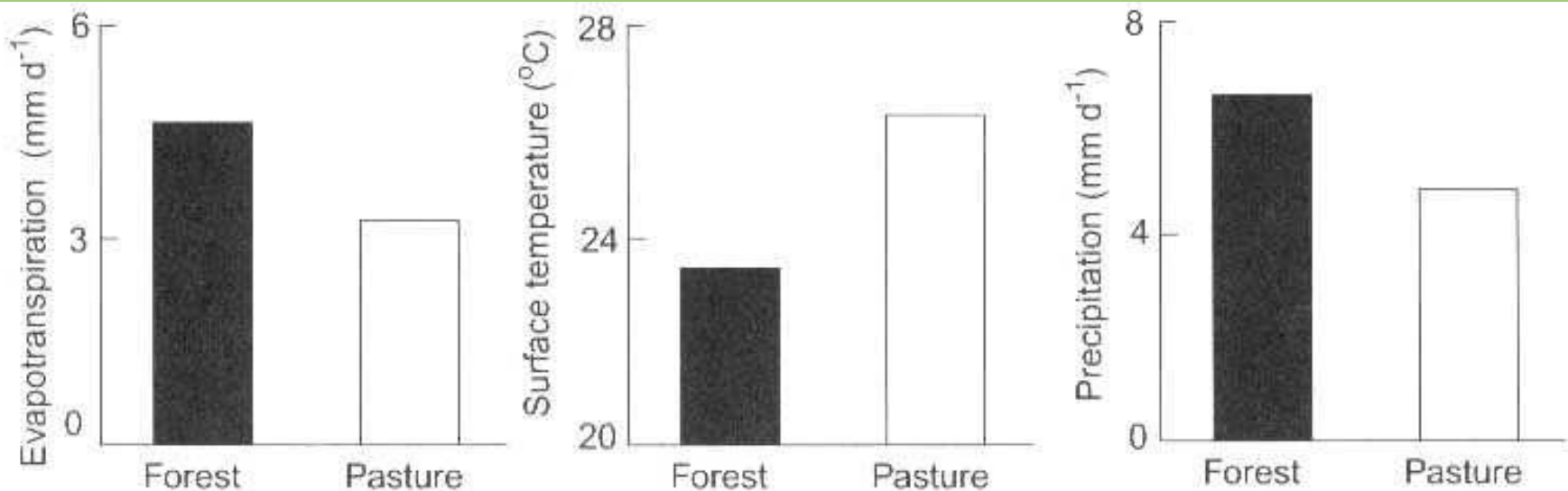


FIGURE 2.11. Simulations, using a general circulation model, of changes in evapotranspiration, surface air temperature, and precipitation that would occur if

the rain forests of South America were replaced by pasture (Shukla et al. 1990).

Modifikace (meso)klimatu

- Latentní (výpar) a pocitové teplo (konvekce a kondukce)
- evapotranspirace – až 75% podíl na turbulentním přenosu E od země do atmosféry

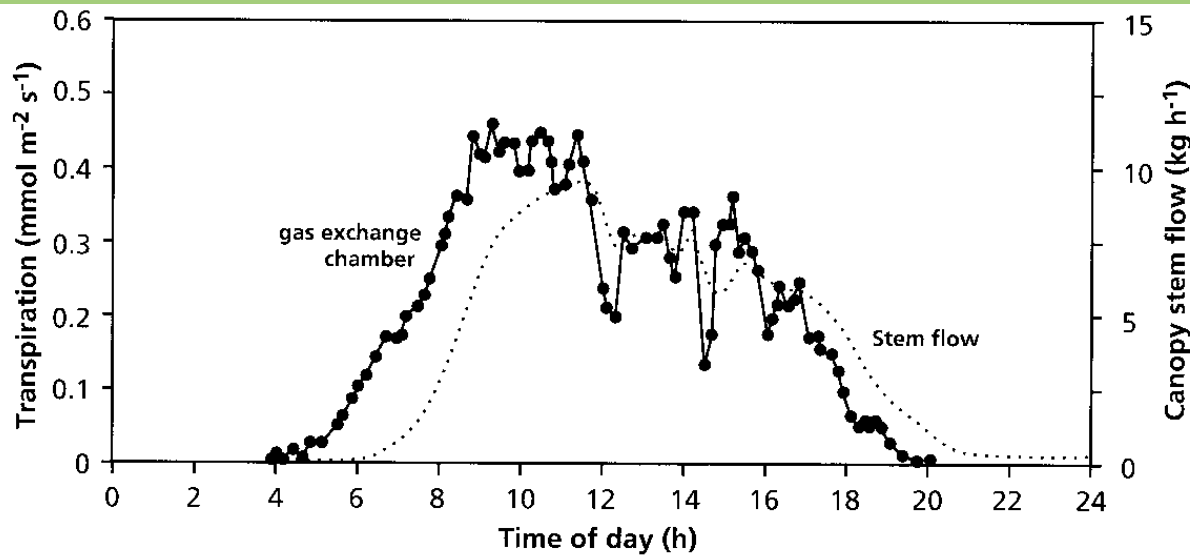
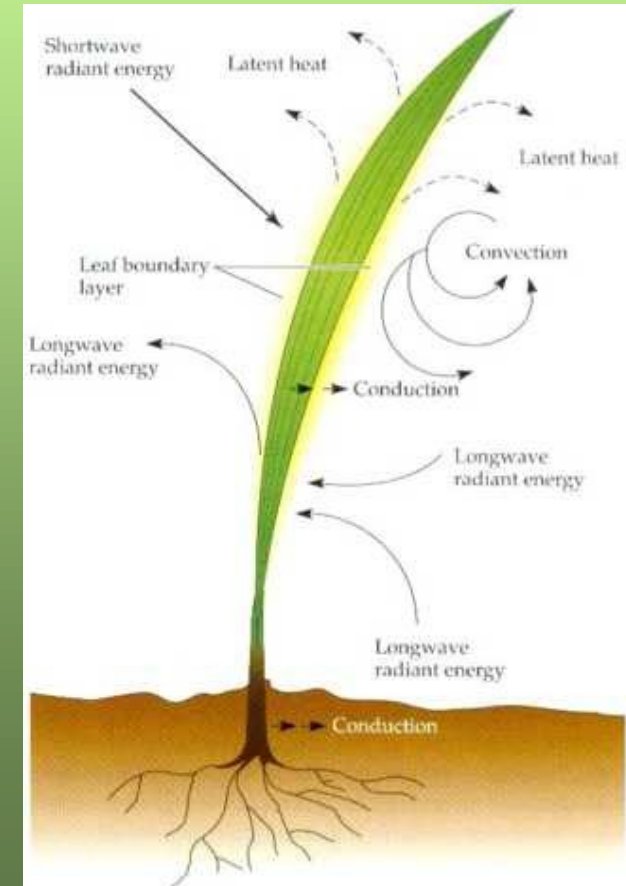
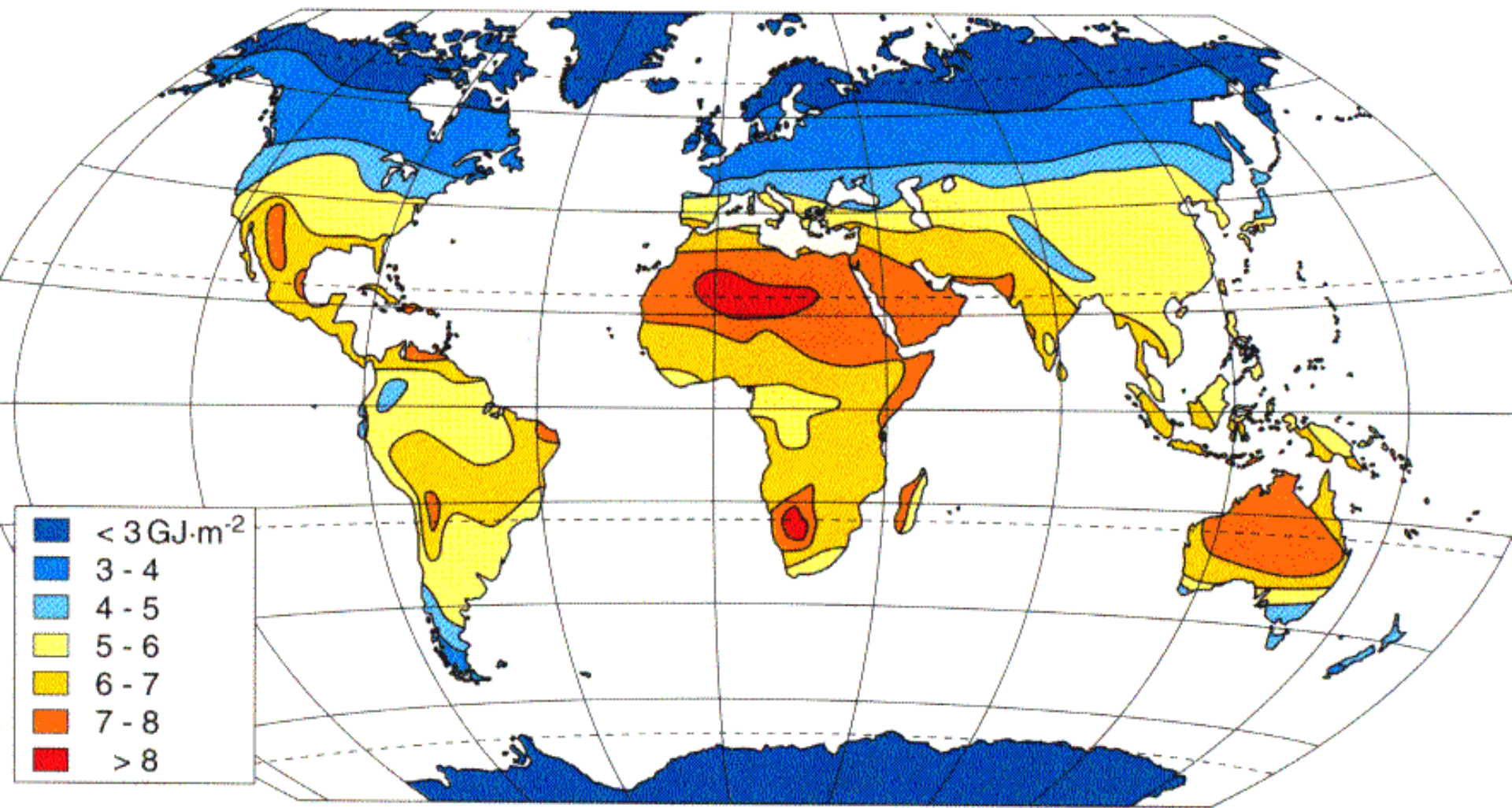


FIGURE 23. Diurnal pattern of water flow in the stem and water loss from transpiring leaves of a *Larix* (larch) tree. The difference between the two lines represents stem storage (Schulze et al. 1985).



***Denní a roční množství
dopadajícího záření
v závislosti
na zeměpisné šířce
a denní době***

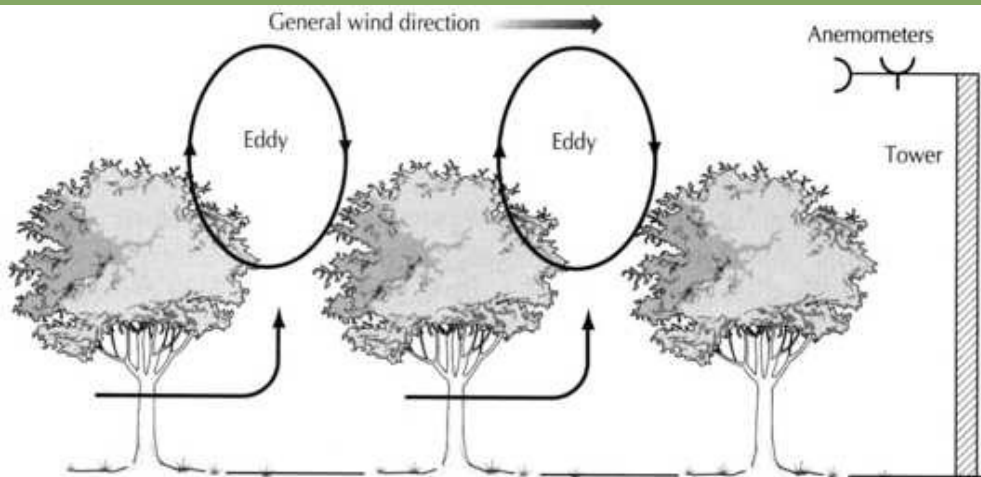
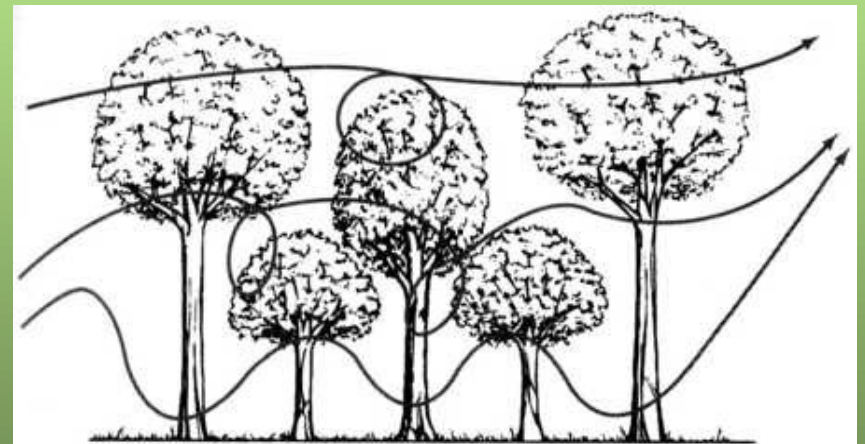


Modifikace (meso)klimatu

- Bowenův poměr = pocitové teplo/latentní teplo

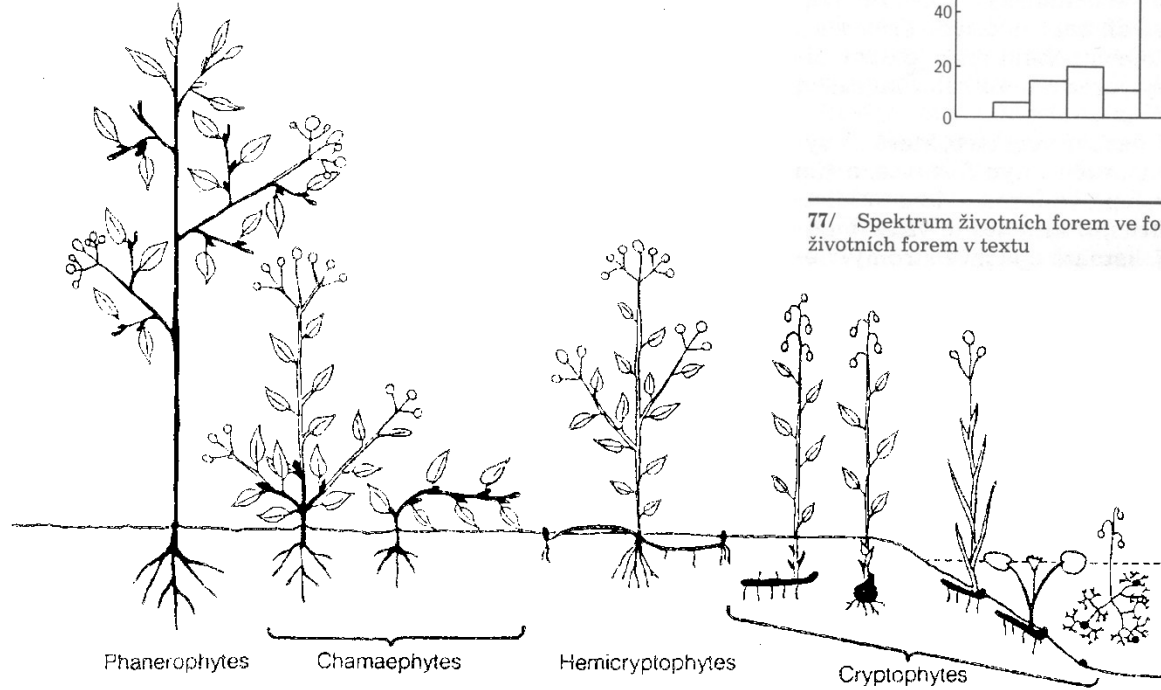
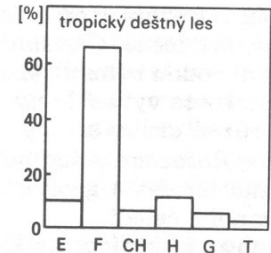
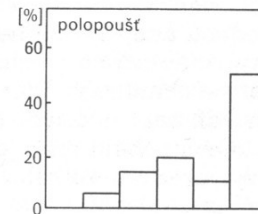
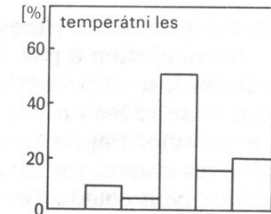
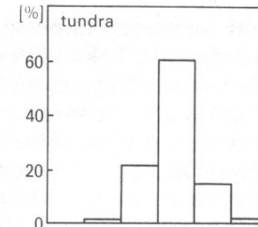
TABLE 4.3. Representative Bowen ratios for different vegetation types.

Surface type	Bowen ratio
Desert	>10
Semiarid landscape	2-6
Arctic tundra	0.3-2.0
Temperate forest and grassland	0.4-0.8
Boreal forest	0.5-1.5
Forest, wet canopy	-0.7-0.4
Water-stressed crops	1.0-1.6
Irrigated crops	-0.5-0.5
Tropical rain forest	0.1-0.3
Tropical ocean	<0.1



Životní formy rostlin ve vztahu k charakteru stanoviště a převažujícímu klimatu

Raunkiaer (1905) - klasifikace podle
uložení přetrvávajících meristematických
pletiv během nepříznivého období pro
růst (zima, sucho)



77/ Spektrum životních forem ve formacích různých zeměpisných šířek. Zkratky životních forem v textu

Figure 1.3 Physiognomic classification of plants according to the relative position of perennating parts. The untuned parts of the plants die back during unfavourable periods of the year but the other parts of the plant persist and give rise to new growth the following season. Therophytes, which persist only as seeds, are omitted. (After Raunkiaer, 1934.) (From C. Raunkiaer, *The Life Forms of Plants and Statistical Plant Geography*, 1934; by permission of Oxford University Press.)

Dámy a pánové, děkuji Vám za pozornost

