



water footprint of VIRGINIA SIDA

Balance is the basis of life on Earth, and every living creature takes its part in forming it. Trees, woody and herbaceous plants have all inherited their ability from cyanobacteria to absorb the light energy of the Sun, which energy they store and live from. They create wood, fibres and leaves which will then decompose to a mixture of water, mineral and organic substances, and the soil shall be gradually formed.

All living things are in connection: water, air, the soil, the flora! Trees, woody and herbaceous plants all exhale groundwater to the atmosphere in the form of dewdrops, forming a „tent” above the soil, that is how they reduce the effect of large rainfalls, and they also protect the soil from erosion, they cool down the environment! Virginia Sida doesn't require much water, it is a xerophyte, and at the same time it is capable of optimizing the water content of the soil.

Life connects water, air, the Earth and the Sun. Virginia Sida has a great significance in restoring biodiversity.

Temperature

is a very important factor regarding life. Temperature depends on radiation everywhere on Earth, because the surface of Earth absorbs and then transforms the energy coming from the Sun to heat. This means that the flora is exposed to the effects of soil and air temperature simultaneously, so they influence the pace of occurrence of vital processes of the plants together. The concentration of greenhouse gases also effects the temperature. If the temperature increases, plants evaporate more and release more heat. However, if they don't have enough water for that, then the temperature of the plant will increase. The Penman-Monteith equation indicates that every temperature increase of 1°C will result in a 2-3% increase in evapotranspiration (evaporation from the soil and plants). In case of a warming, growth of plants will be faster, phenological phases will shift, which means that leaf surface will reach its largest size earlier, and the period which requires the most water for evaporation will adjust accordingly. Proportion of the weights of the individual parts of plants and the size of these parts may also change.

Water

is an essential element for plants. Water gets to the leaves from the roots through the stem, and assimilation will take place on the leaves. Assimilation requires water, and water will also transport the necessary nutritives in dissolved form. Due to lack of water, intensity of photosynthesis will decrease, which is a way of protection against harmful water shortage. It is expected, and partially it can already be observed, that as a result of the climate getting drier and drier, mediterranean and Balkan species will spread, and cosmopolitan and adventive weeds will proliferate.

Approximately 14 g CO₂, 1 g nutritive and 80-90 g water get bound in the cell structures and the plant tissues for a 10 g/day growth of dry substance per m².

As for true value, in the temperate zone, evapotranspiration reaches a value of 3 liter/m² per day, which equals to a latent heat amount of 2,1 kWh (7,5 MJ). In this case, about 3.09 kg/m² water flows through the plants.

Considering all this, applying not the generally recognized Penman-Monteith equation, but an empirical comparison method, we get that

water footprint is **385 liters of water / 1 kg of Virginia Sida.**

As a comparison: the same value of sorghum is 2800 liter/kg; that of sunflower is 481 and oilseedrape has a value of 459 liter/kg.

Virginia Sida plantations also collect the energy of the Sun and store it in form of biomass. From that we produce 2nd generation fuel with condensed energy content, a so-called BTL-fuel (biomass to liquid), which fuel is used to produce cogenerated heat and power. In relation to that, we publish the following results of our calculations:

Water footprint of Virginia Sida:	385	liter/kg
	577	liter/m²/year
Altogether	653	liters of water is needed to produce 1 liter CHT,
during that it binds	1,65	kg CO₂ and produces just as much oxygen,
and it requires	1,10	m² of cultivation area!