

Actual water consumption by the chosen weeds of *Asteraceae* family on the mature stage of development depending on environmental conditions

Václav Brant, Jan Pivec, Karel Neckář, Veronika Venclová

Czech University of Life Sciences, Kamýcká 957, Praha 6 – Suchbát, Czech Republic, brant@af.czu.cz

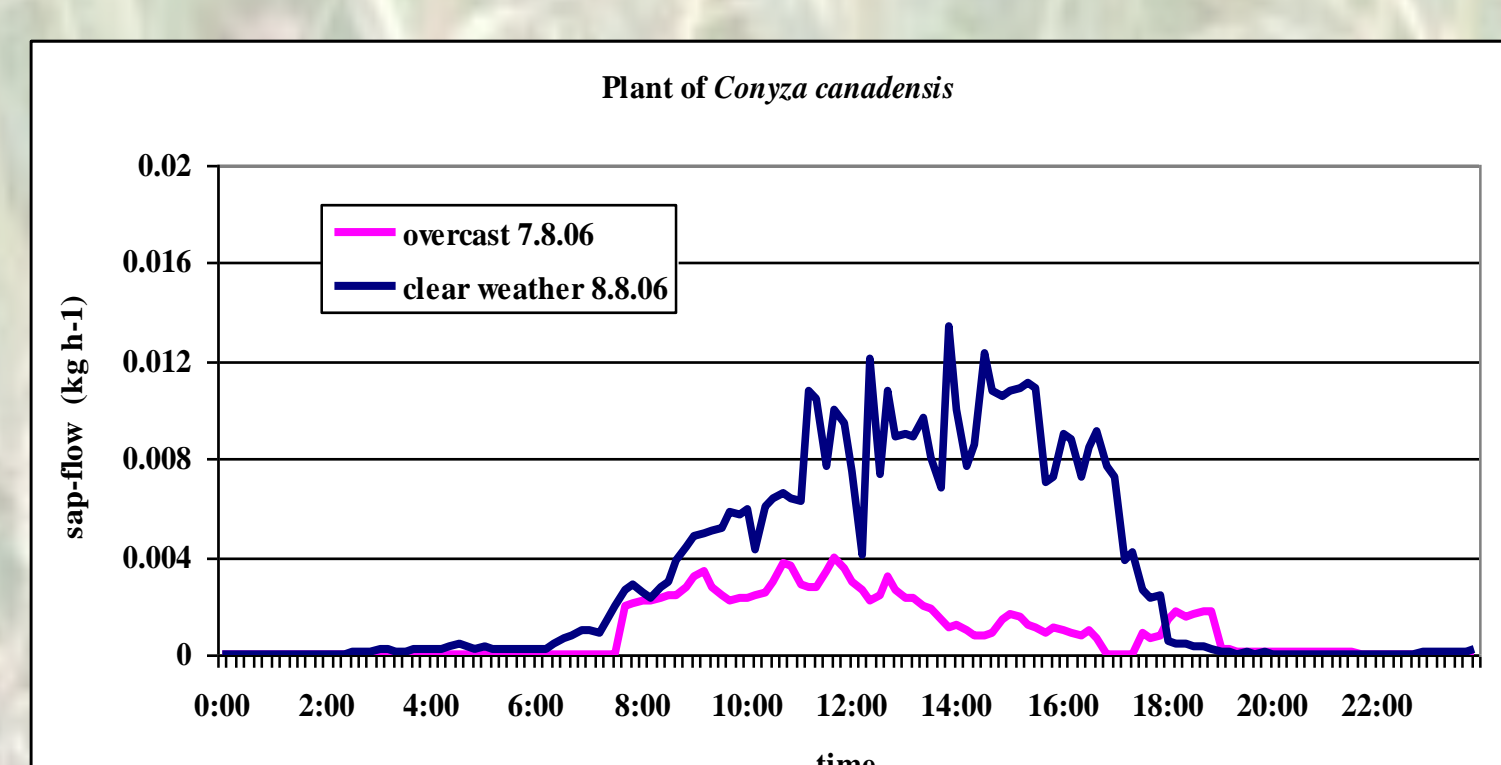
The species composition of the phytocoenosis is one of the factors influencing the water balance of the ecosystems and subsequently the water balance of the agroecosystems. Both crops and weeds participate in the water balance in agrophytocoenosis. Knowledge of crop and weed transpiration is important not only for estimating the whole agrophytocoenosis transpiration but for evaluating water competition between the arable crops and the weeds. Field water demands of the weed species selected from the *Asteraceae* family were observed during the year 2006. The plants observed were *Artemisia vulgaris* L., *Conyza canadensis* (L.) Cronq and *Lactuca serriola* L. The goal of the experiment was to estimate the average daily water consumption of the weed species mentioned above on the basis of sap flow measurements. The experiments were carried out in the trial field of the Czech Agriculture University in Prague – Suchbát from August 3rd to August 27th, 2006.



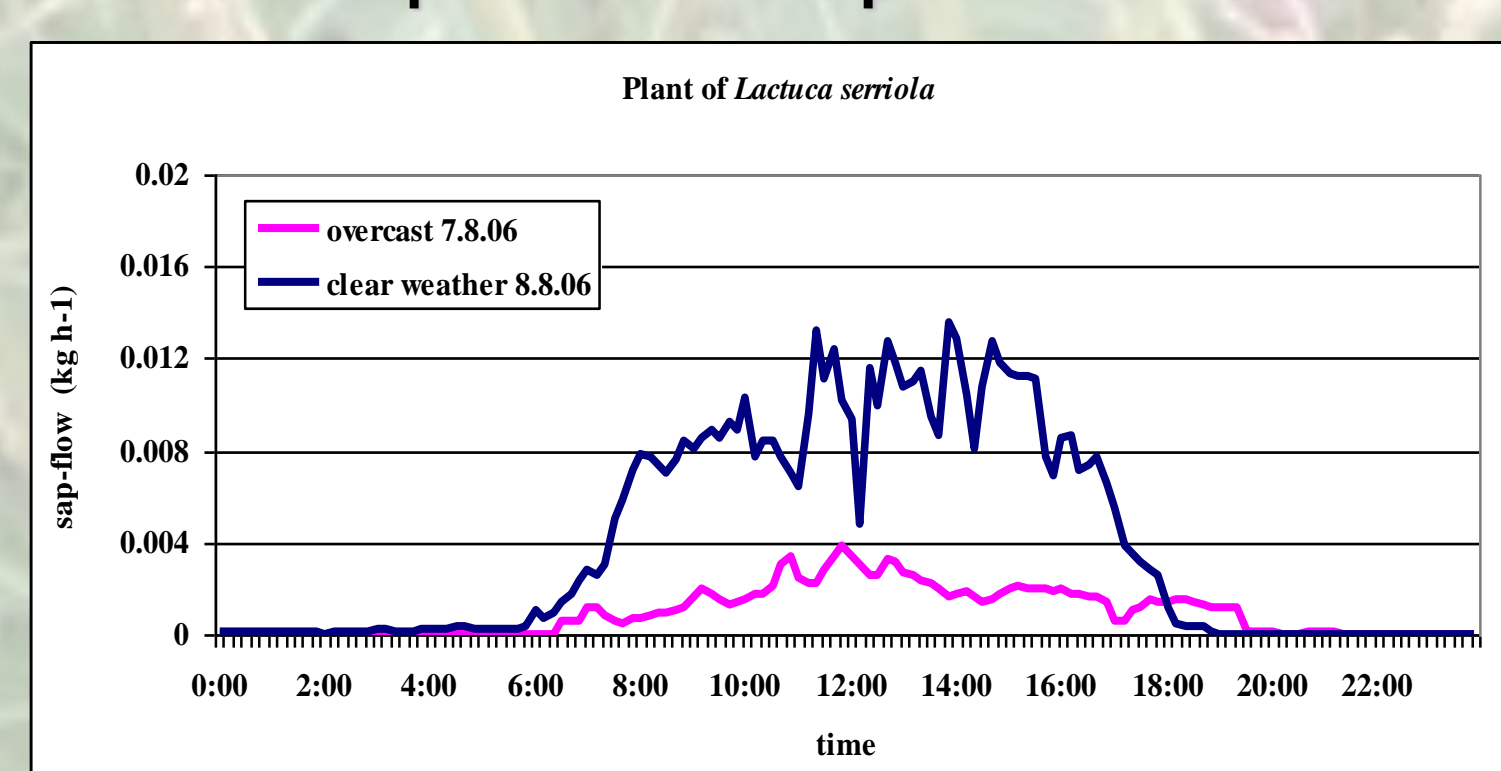
Installation of sap-flow meter T 4.2

The transpiration measurements were realized by the sap-flow meter T 4.2 (EMS, Brno, CZ). The actual values were measured continually within the 10 minutes interval on the seven plants of *C. canadensis* and *L. serriola* and seven stems of three plants of *A. vulgaris* accordingly. In the experimental site other meteorological phenomena such as global solar radiation, air temperature and humidity and precipitation were observed. The plants were in flowering and maturing stage of the seeds during the evaluation process. The average weight of plants or stems (*A. vulgaris*), their height and the base diameter of plants (stems) were estimated at the end of our measurements.

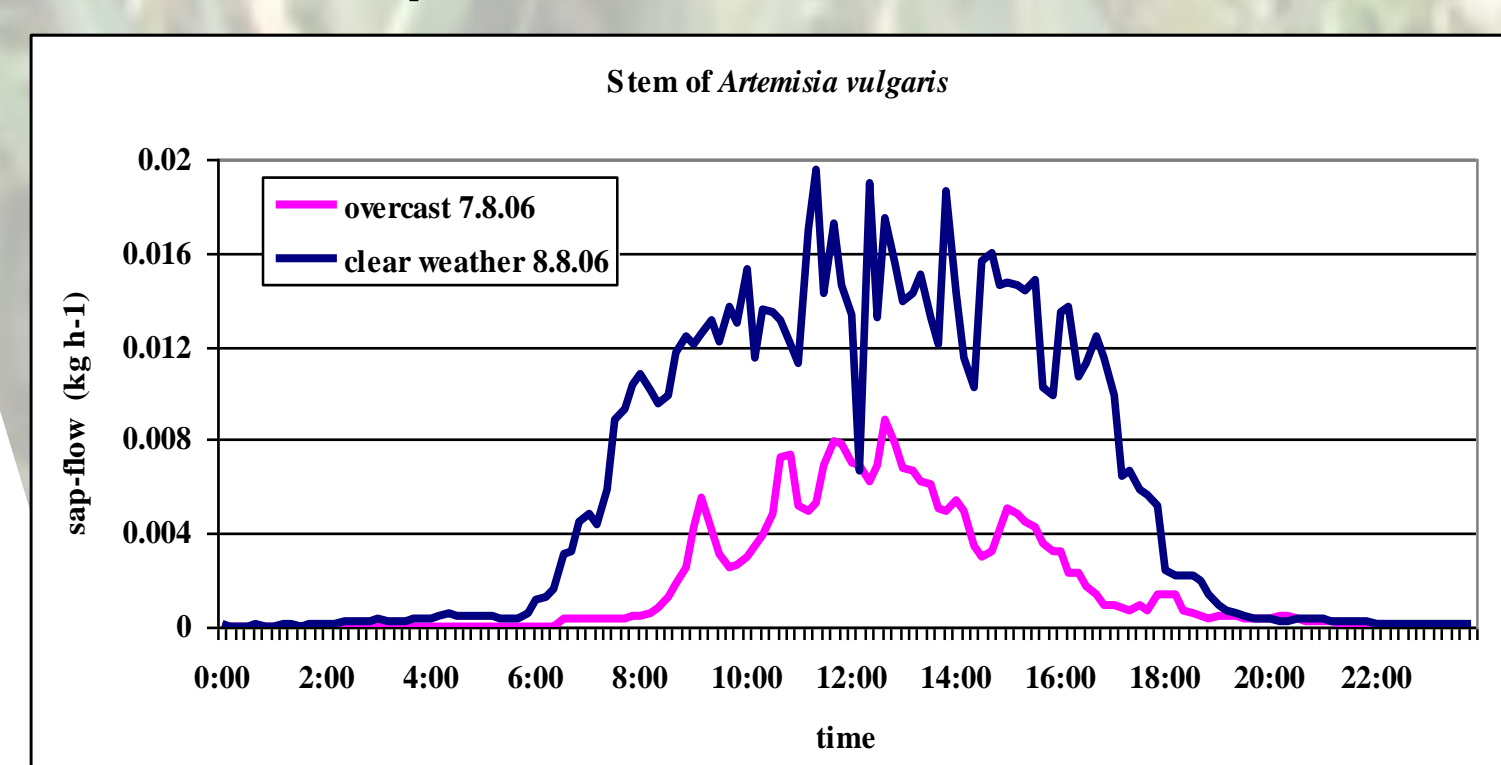
Daily course of sap-flow into the plant of *Conyza canadensis*



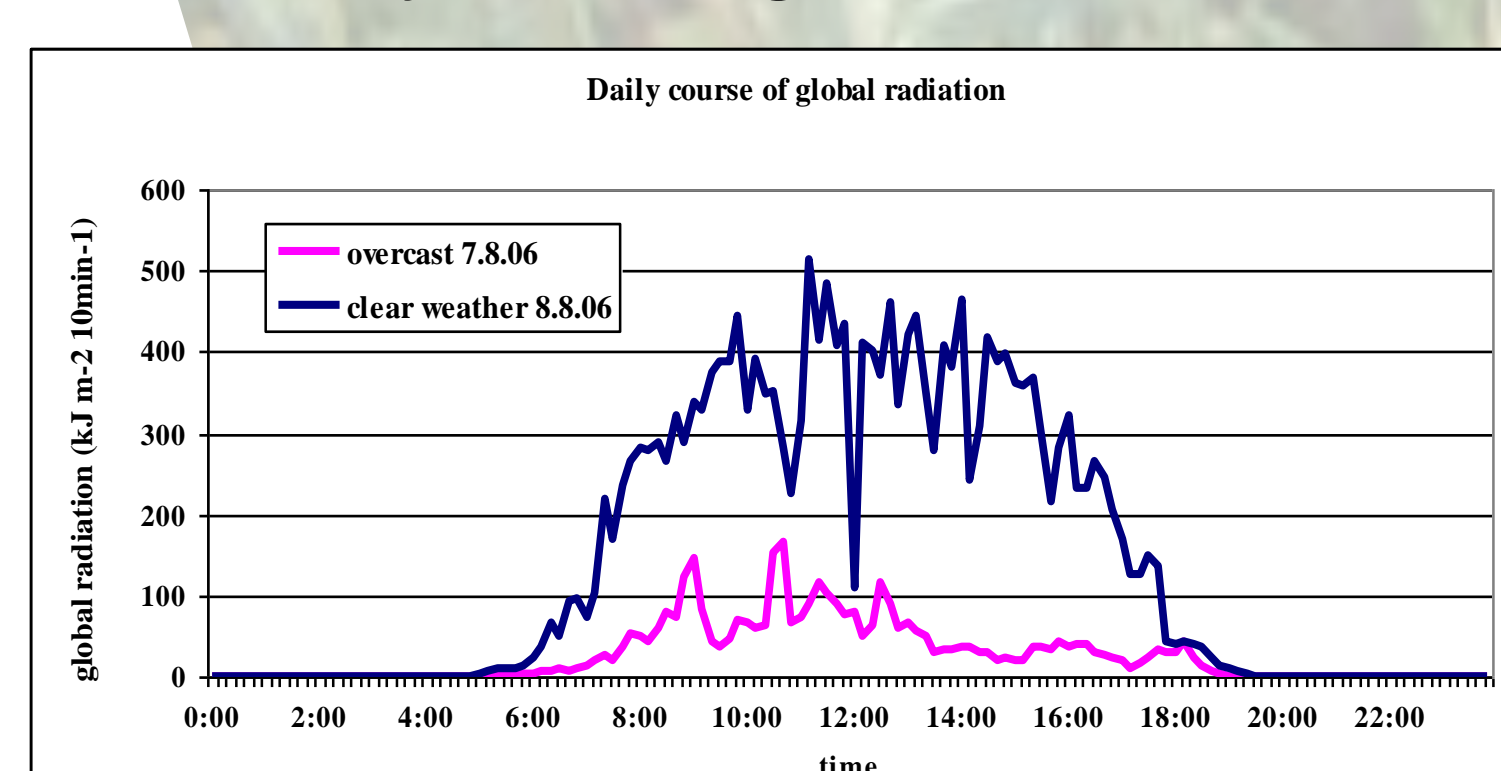
Daily course of sap-flow into the plant of *Lactuca serriola*



Daily course of sap-flow into the stem of *Artemisia vulgaris*



Daily course of global radiation



The average daily sap flow values (an average of the plants evaluated) were 0.045 kg for *C. canadensis* (a standard deviation “s” equals to 0.036) and 0.072 kg for *L. serriola* (s = 0.066). The average sap flow through one stem of *A. vulgaris* was 0.076 kg (s = 0.050). The average weight and height figures of evaluated plants (stems) were 68.7 g and 1584 mm for *A. vulgaris*, 18.2 g and 1166 mm for *C. canadensis* and 46.9 g and 1518 mm for *L. serriola*. Following our actual results we have found the amount of sap flow correlates well with the global solar radiation if sufficient amount of soil water is provided. In case of weed plants suppressed by crop plants, the sap flow is significantly influenced by the vapor pressure deficit. The considerable fluctuation of the sap flow values during the day as well as daily fluctuation within the period evaluated (see “s”) was caused by the solar radiation dependency. In addition to it, the sap flow was influenced by the air temperature and humidity. If we compare e.g. the daily water consumption of the weeds mentioned above with the sap flow through *Brassica napus* (variety Navajo) which varied from 0.012 to 0.119 kg day⁻¹ within the flowering and maturing stage during our measurements in the year 2005 we can conclude the water demands of *B. napus* are similar to those of *C. canadensis* and *L. serriola*. The occurrence of one *L. serriola* plant per square meter in the *B. napus* crop concerning its water demands is of the same effect as the increase of *B. napus* number by one plant per m². Concerning *A. vulgaris* the whole water consumption is conditioned by the number of stems per plant. If the number of stems longer than 1 meter per plant is between 2 and 10, then the daily water consumption is between 0.152 and 0.760 kg per plant which is more than we measured in case of *Zea mays* (0.350 kg day⁻¹plant⁻¹). Our results showed that the transpiration demands of the evaluated weeds reached the same or higher values in comparison with some cultural plants.