

Water consumption of field crop species' protein formation

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Introduction

Water supply is one of the major physiological factors influencing plant growth and development. The water footprint shows the extent of water use in relation to consumption. Crop water use, consumptive use, and evapotranspiration are terms used interchangeably to describe the water consumed by a crop. This water is mainly used for physiological processes, only a negligible amount is retained by the crop for building its tissues. Water requirements for crops depend mainly on species and environmental conditions.

Materials and methods

An assessment study has been done at the Szent István University, Gödöllő to evaluate and identify the water footprint of protein yield of field crop species. Six field crop species (Sugar beet *Beta vulgaris*, winter barley *Hordeum vulgare*, winter wheat *Triticum aestivum*, maize *Zea mays*, potato *Solanum tuberosum*, and alfalfa *Medicago sativa*) were involved in the study. Evapotranspiration patterns of the crops studied have been identified and physiologically reliable protein ranges within crop yields were evaluated.

Results and discussion

Table 1 Water footprint of six field crop species (SZIU, 2017)

Crop	protein %	crop yield tha ⁻¹	protein yield kgha ⁻¹	protein kg / ET mm	litre / protein g
<i>Medicago sativa</i>	18.0	4.35*	783	1.32	44.9
<i>Solanum tuberosum</i>	2.0	24.9	498	0.97	52.7
<i>Beta vulgaris</i>	1.1	41.2	453	0.96	49.1
<i>Triticum aestivum</i>	13.0	4.8	624	1.83	23.1
<i>Hordeum vulgare</i>	16.5	4.1	676.5	1.88	18.9
<i>Zea mays</i>	9.5	5.8	551	1.09	46.5

*hay

Water footprint of six field crop species (Sugar beet *Beta vulgaris*, winter barley *Hordeum vulgare*, winter wheat *Triticum aestivum*, maize *Zea mays*, potato *Solanum tuberosum*, and alfalfa *Medicago sativa*) were evaluated.

The results obtained presented in Table 1 suggest, that water footprint of cereals proved to be the lowest, however maize values were highly affected by the high variability of protein yield. Alfalfa, potato and sugar beet water footprints were in accordance with their evapotranspiration patterns.

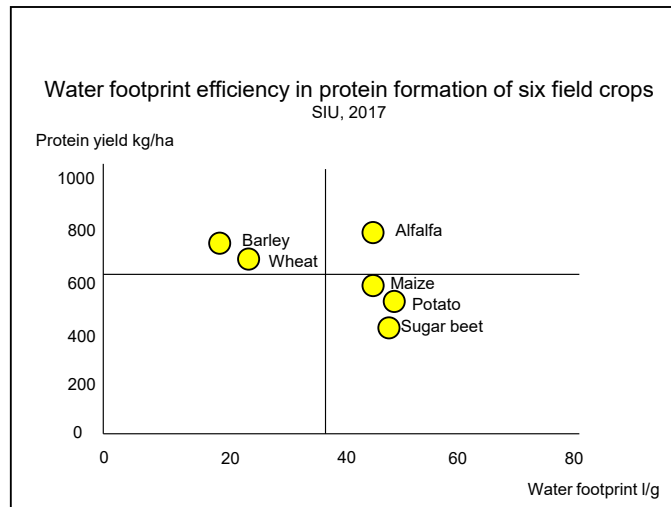


Figure 1. Water footprint efficiency (SZIU 2017)

Figure 1. provides information on the magnitude of protein yields of certain field crop species and the amount of water used for its formation.

Conclusions

Physiological characteristics of field crop species highly influenced the magnitude of their water footprint. According to the results of the study protein yield proved to be the most reliable basis for comparison of water footprint performance

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