



Influence of time scale wind speed data on sustainability analysis for irrigating greenhouse crops

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Appropriate water supply at crop/farm level, with suitable costs, is becoming more and more important. Energy management is closely related to water supply in this context, being wind energy one of the options to be considered, using wind pumps for irrigation water supply. Therefore, it is important to characterize the wind speed frequency distribution to study the technical feasibility to use its energy for irrigation management purpose.

The general objective of this present research is to analyze the impact of time scale recorded wind speed data in the sustainability for tomato (*Solanum lycopersicum* L.) grown under greenhouse at Cuban conditions using drip irrigation system. For this purpose, a daily estimation balance between water needs and water availability was used to evaluate the feasibility of the most economic windmill irrigation system. Several factors were included: wind velocity (W , m/s) in function of the time scale averaged, flow supplied by the wind pump as a function of the elevation height (H , m) and daily greenhouse evapotranspiration. Monthly volumes of water required for irrigation (Dr , m³/ha) and in the water tank (Vd , m³), as well as the monthly irrigable area (Ar , ha), were estimated by cumulative deficit water budgeting taking in account these factors.

Three-hourly wind velocity (W_{3h} , m/s) data from 1992 till 2008 was available for this study. The original data was grouped in six and twelve hourly data (W_{6h} and W_{12h} respectively) as well as daily data (W_{24h}). For each time scale the daily estimation balance was applied. A comparison of the results points out a need for at least three-hourly data to be used mainly in the months in which mean wind speed are close or below the pumps threshold speed to start-up functioning.

References

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