



## Wind pumps for irrigating greenhouse crops

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Agriculture is a major consumer of energy in many countries of the world. Only a few of these countries are self-sufficient in conventional energy sources, which are also exhaustible. Fortunately, there are other sources of energy, such as wind, which has experienced recent developments in the area of wind power generation. From irrigation projects to power supply in remote farms, wind power generation can play a vital role.

A simple methodology for technical evaluation of windmills for irrigation water pumping has been developed in this study to determine the feasibility per unit amount of water supplied and the levels of daily irrigation demand satisfied by windmill irrigation system at various levels of risk (probability of failure).

For this purpose, a series of three hourly wind-speed data over a period of 38 years at Ciego de Ávila, Cuba, were analyzed to compute the diurnal wind pump discharge at varying levels of risk. The sizes of reservoirs required to modulate fluctuating discharge and to satisfy the levels of irrigation demand, on function of crop development dates, cultivated area and water elevation height, were computed by cumulative deficit water budgeting. An example is given illustrating the use of the methodology on tomato crop (*Lycopersicon esculentum* Mill) under greenhouse.

### References

Peillón, M.E., Tarquis, A.M., García, J.L. and R. Sánchez. The use of wind pumps for irrigating greenhouse tomato crops: a case study in Cuba. Geophysical Research Abstracts, Vol. 13, EGU2011-64-1, 2011.