



Optimizing the Performance of a Spiral Water Wheel Pump

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Introduction

An increasing world population and global expansion in farmland has increased the need for more efficient use of water. The spiral water wheel pump appears to be a useful and inexpensive option for providing water for surface and subsurface irrigation for fields close to flowing water bodies. This low-cost water lifting device is more economical than conventional energy sources like diesel pumps, and renewable sources such as solar-powered pumps. It is fabricated from PVC and wood and reduces the effect of global carbon. However, it can only be used in water bodies where the water velocity exceeds 2 feet per second.

Objective

The objective of this study was to design, construct and evaluate the performance characteristics (flow rate and maximum head lift) of a spiral water wheel pump, in order to optimize pump performance at any given location.

Method and Materials

- ❖ Pipes coils of three pipe diameters were used to test pump performance for head lift and discharge rate in the laboratory
- ❖ In field tests, three scoop sizes were tested on a 4ft diameter wheel to determine the effect of the head and discharge, and two wheel diameters and two designs were tested over a range of stream water velocities.



Laboratory and field testing a 4ft wheel



Field testing a double hexagonal pipe coil on the University Farm

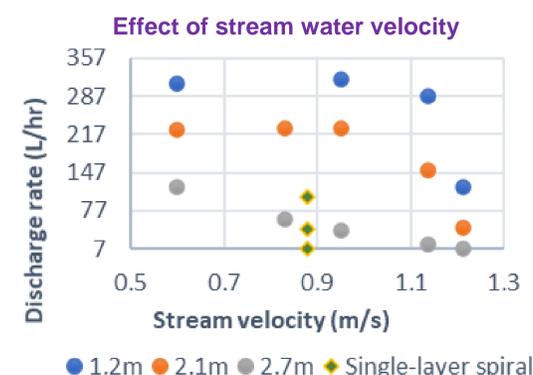
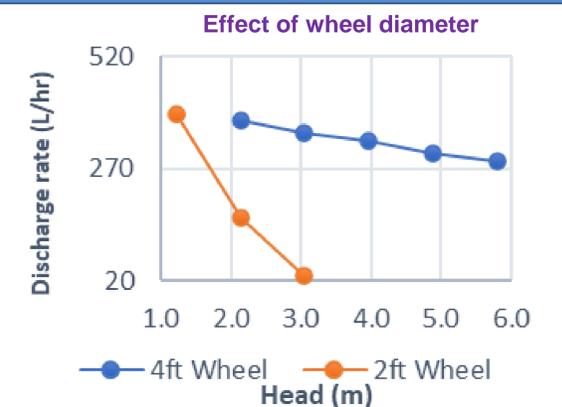
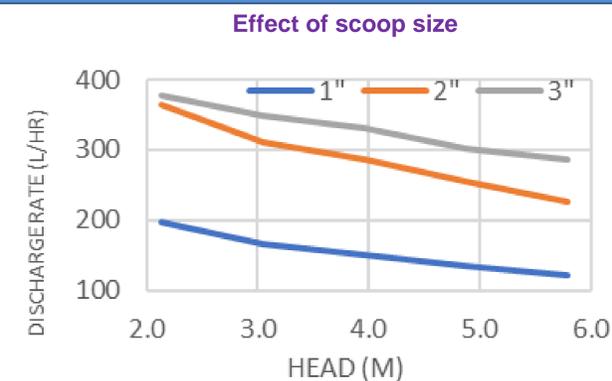
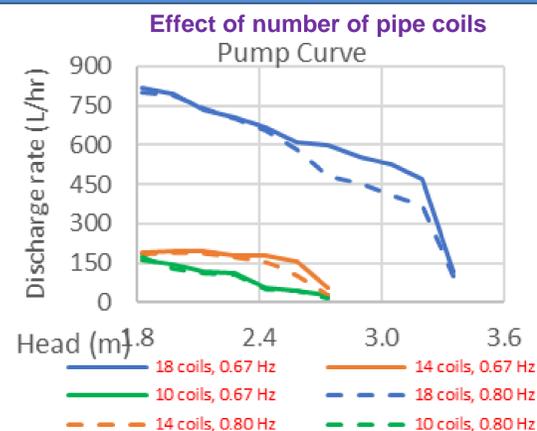


Field testing a 2ft wheel at a research site in Fulton County



Pump installed in a stream in the village of Yele in Sierra Leone

Result



The number of pipe coils had a significant effect on discharge rate the maximum head to which water could be lifted.

The 2-foot diameter wheel was easier to handle and less expensive to construct.

The pump was developed as an alternative to solar powered pumps for use in sub-irrigation systems. It is also being used to facilitate dry-season irrigation in rural areas of Sierra Leone.



Acknowledgements

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