Quantification of wind erosion under four different types of vegetation cover in quinoa fields of the Southern Bolivian Highlands

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Introduction

The high nutritional value of quinoa (*Chenopodium quinoa* Willd.) has attracted increasing markets around the world. Many farmers in Bolivia have become interested in producing quinoa to improve their livelihoods through the exportation of this commodity. Consequently, the quinoa production area has extended significantly the last decades, increasing pressure on land and on natural resources, reducing native vegetation and soil fertility and even causing serious desertification processes in some areas.

Due to the predominant sandy characteristics of soils in major quinoa production areas of Bolivia (the Southern Highlands), wind erosion constitutes an important problem for the sustainability of this region. Lately dust storms are taking place more frequently and harming production by covering completely the crop.

Few studies have directly measured wind erosion (Sander and Lukas 2011); therefore the present research has the objective of quantifying wind erosion in the fields under different vegetation covers related to quinoa production system.

Method

The study is conducted in Saitoco, a community sited in a representative quinoa production area in the Southern Highlands. With a semi-arid climate, winds in this area can easily reach velocities of 25 m/s.

Big Spring Number Eight (BSNE) sediment samplers developed by Fryrear (1986), consisting of three samplers attached to wind vanes and horizontally mounted in a central pole at heights of 13.5, 50 and 150 cm were implemented in the community.

The experimental unit is composed of a cluster of two BSNE collectors spaced 50 m apart horizontally across the field and disposed according to the predominant wind direction in the studied site. Three replications were considered within homogenous plots of 6400 m^2. Wind erosion is being quantified in four different types of vegetation cover related to quinoa production systems: (1) quinoa plot without fertilization; (2) quinoa plot with traditional practices of fertilization; (3) fallowing plot, and (4) a natural vegetation plot (Fig 1).

Meteorological information is monitored in the studied area through an automatic meteorological station, and clusters of anemometers at three different heights were implemented to monitor wind at the same heights of the BSNE samplers.

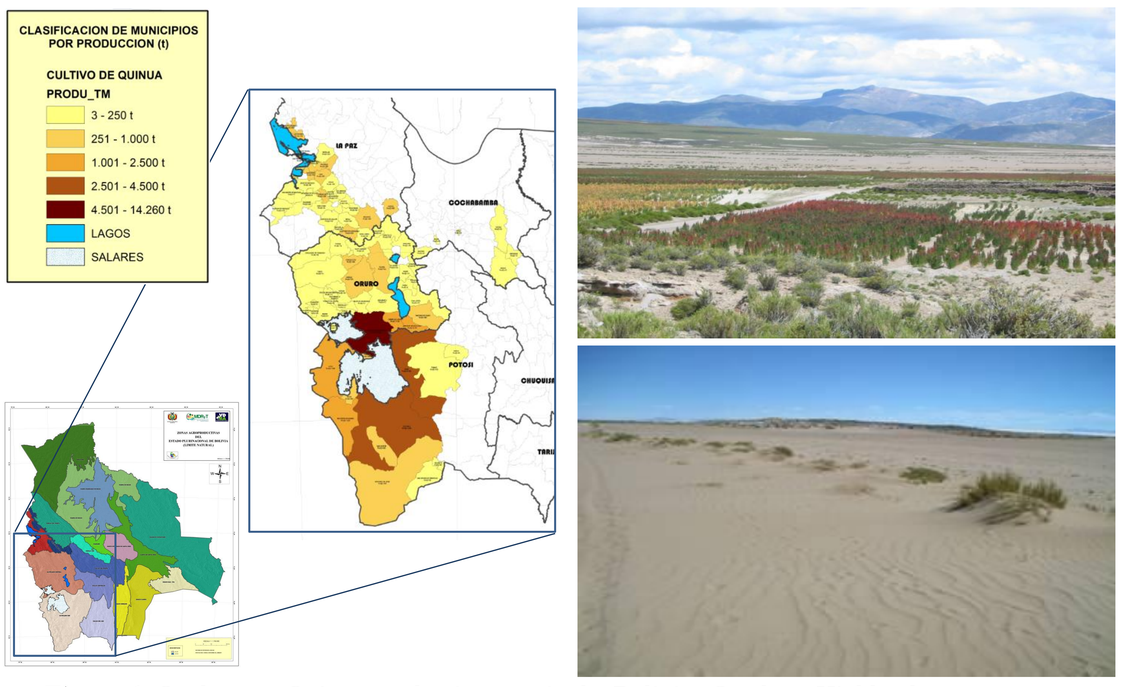

Figure 1. Study area: Quinoa production area in the Bolivian Southern Highlands.

Results

The first set of data from the experiment is being collected from the implementation of the experiment, in September 2011, until the harvesting season, planned by the end of April 2012.

Besides the characterization of the soil and soil water contents, the collected variables are: volume of eroded soil (t/ha); collected particle size; wind velocity relative to erosion (m/s); variation of erosion in relation to time (t/m^2/year); and Nitrogen concentration in the sediment collected.

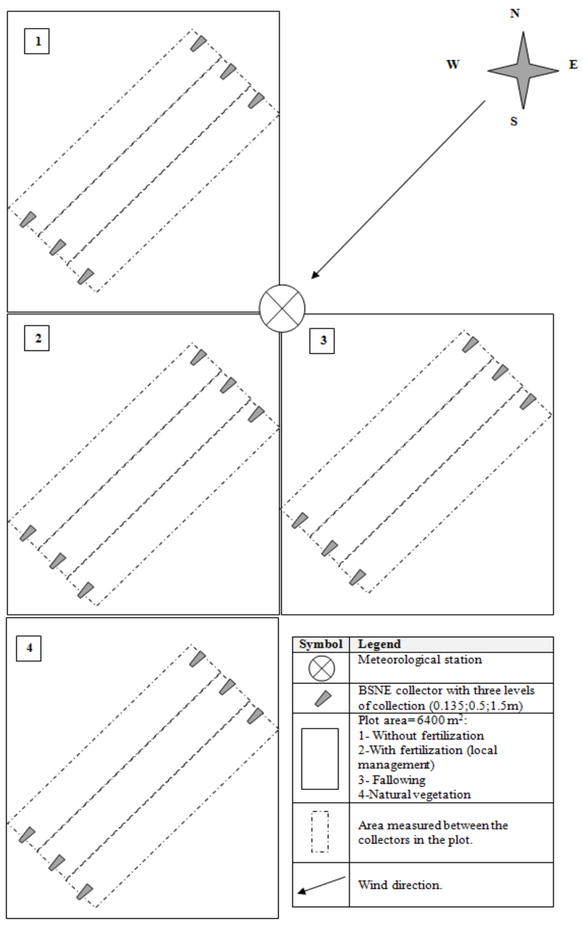

Figure 2. BSNE samplers used and experimental design.

Perspectives

Later the study is planned to quantify wind erosion in the absence of crops and to be implemented in other representative areas of quinoa production where erosion has been reported. This information is planned to be used to raise public awareness and if possible to apply results in a model to project quinoa production impacts for the future.

References

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