

**PhD Topic:** The Role Of Cactus Pear (*Opuntia ficus-indica*) in Climate Change Adaptation and Restoration of Degraded Dry-lands, in Northern Ethiopia.

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**Abstract:** This research project was developed with the objective of evaluating and documenting the economic and ecological role of cactus pear in climate-change adaptation and in the restoration of degraded dry-lands in Northern Ethiopia, located in the tropics. It is designed to document the perceptions and traditional practices of the local community in respect of the management, uses and utilisation of the cactus-pear plant, to identify its role as a source of food, feed and income to the dry-land inhabitants, to identify the key environmental variables that determine its distribution and density and to measure the floristic association of cactus pear with the native vegetation species. It will also identify the role of cactus pear in habitat restoration, mainly in the physical and chemical properties modification of soil. A sample survey will be conducted to gather data that pertain to the traditional knowledge and perception of farmers about the spread, establishment, use, utilisation, management and phenology of the plant. During the survey research, a total of 270 households from three potential cactus-growing districts will be interviewed using a semi-structured questionnaire. Data collected through the questionnaires will be supplemented by information that will be obtained from 27 focus-group discussions, key-informant interviews and personal observation. The data will be substantiated by cross-questioning and field checks at the time of the survey. Data collected from the survey will be summarised and described using descriptive statistics.

Two watersheds will be selected, based on their cactus-vegetation cover, for the measurement of vegetation, soil and environmental variables. In each watershed, two parallel-line transects of 1 000 m in length will be laid down. The spacing between the transects will be 75 m to 100 m. Twenty quadrat plots with a size of 10 m x 10 m each will be systematically distributed along each transect for vegetation-parameter data collection. In each 10 m x 10 m major plot, two subplots with a size of 1 m x 1 m and with spacing of 4 m to 8 m will be established (one under the cactus canopy and one on an adjacent open area) to collect soil samples and to measure environmental variables. Data on vegetation, soil and environmental variables will be collected from a total of 80 plots. These will be analysed using SPSS software and significant differences will be tested at a 5% level of probability. The working hypotheses of this research project are as follows: 1) Cactus-pear expansion has no negative effect on the composition and diversity of native vegetation species; 2) cactus pear has no effect on the physical and chemical properties of soil; and 3) different environmental variables have no impact on the spatial distribution and density of cactus pear in the study area. The outputs of this research project will be important to policy makers, environmentalists, ecologists, development workers, non-governmental organisations and farmers. To disseminate the results of the research, the findings will be synthesised and submitted to international journals, and papers will be presented at international conferences and workshops. A total of US\$15 000 will be requested to accomplish the intended research project. The research project will be completed within a 36-month period.

**Disciplinary history:** BSc Animal Sciences, Alemaya Agricultural University, Ethiopia; MSc Rangeland Management, University of Nairobi, Kenya

**Faculty/department of registration:** Institute of Environmental and Sanitation Studies, University of Ghana (2013)