

Mapping High-Potential Areas of Pineapple Cultivation in Sri Lanka by using MaxEnt Model and Constraints Analysis

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Although pineapple is a major commercial fruit in Sri Lanka, it is widely growing only in Gampaha and Kurunegala districts. But it can be expanded to other districts as well. This study was aimed to model the high-potential areas of pineapple cultivation in Sri Lanka using MaxEnt model which has great potential for identifying best ecological requirement of species based on "presence only data" together with environmental variables. Data on 215 GPS pineapple cultivation locations covering whole Sri Lanka and raster environmental layers for monthly rainfall, monthly mean temperature, Digital Elevation Model (DEM), slope, slope facing direction and Normalized Difference Vegetation Index (NDVI) were used for this study. The resulting model was validated by using area under the receiver operator characteristic curve analysis and jack-knife test. In addition to mapping, a questionnaire survey was conducted with a sample of 60 farmers in four divisional secretariat divisions of Gampaha and Kurunegala districts to explore prevailing conditions and constraints of pineapple cultivation. Highly significant constraints were identified using Wilcoxon signed rank test. Probability prediction map developed by MaxEnt with high predictive power (AUC = 0.913) indicated that some parts of Ampara, Monaragala, Puttalam Colombo and Kaluthara districts as high potential areas in addition to Gampaha and Kurunegala districts. According to jackknife test, mean temperature in drier months and total rainfall during wet months showed relatively high correlation for the pineapple growth. Wilcoxon signed rank test proved that high cost of inputs, high price of mulching materials, shortage of labours, high investment, lack of government subsidy facilities, weed problems and threat of mealy bug attack as highly significant production constraints while lack of guaranteed price as the major marketing constraint for pineapple cultivation ($P < 0.05$). These predicted high-potential areas of pineapple are useful for farmers, investors and entrepreneurs to take information-based cultivation decisions.

Keywords: Global positioning system, MaxEnt model, Pineapple cultivation, Probability mapping