

Abstract

Frost is a perennial agricultural hazard within the Aberdares and Mt. Kenya regions that normally causes crop damage leading to huge agricultural losses. This is aggravated by inadequate information on frost risk to cushion investors and farmers against losses. This research maps frost hotspots within the Aberdare and Mt. Kenya regions, while identifying the extent of arable land at risk of frost damage so as to establish the implication of frost occurrence on food security and economic growth. It also establishes the trend of minimum temperature occurrences between the years 2000 to 2013 in order to identify any existing patterns in frost occurrences. Minimum temperature values were extracted from monthly MODIS LST datasets using ENVI 4.7 software and frost risk categorized into very severe frost (<250K), severe frost (250-260K), moderate frost (260-270K), minor frost pockets (270-280K) and areas of no frost (>280K) using ENVI 4.7 decision tree classifiers. Frost was found to concentrate around the Aberdares and Mt. Kenya regions with temperatures below 270K concentrating in regions above 1500m asl. Elevation, land surface convexity as well as high rainfall are some of the factors that were found to influence its occurrence. Time series analysis of minimum monthly temperatures extracted from MODIS LST data in ArcGIS showed recurrent patterns of minimum temperature occurrences in the months of April, May, July, August and November. The study proposes adoption of resilient crop cultivars, use of manual protective measures such as sprinkler irrigation, artificial wind breeze induction and use of green houses, crop rotation based on growth durations as well as planting site selection based on crop susceptibility as well as land surface curvature in order to mitigate the losses and ensure maximum crop production.