شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

Ain Shams University Information Network
جامعة عين شمس
شبكة المعلومات الجامعية
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HANAA ALY

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ASSESSMNET OF SPECTROSCOPIC AND MORPHOLOGICAL PROPERTIES OF SOME FRUIT CROPS UNDER THE INFLUENCE OF POLLUTION WITH HEAVY METALS USING REMOTE SENSING TECHNIQUES

By

AMANY FAROUK ABDELHAMEED ELWESEMY

B.Sc. Agric. Sc. Fac. Agric., (General Division), Tanta Univ. 2011

M.Sc. Agric I n Desert. (Salt Affected Areas), Fac. Agric., Ain Shams Univ., 2016

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ABSTRACT

Amany Farouk Abd-ELhameed ELwesemy: Assessment of. Spectroscopic and Morphological Properties of. some Fruit Crops under the, Influence of. Pollution with Heavy Metals Using Remote Sensing Techniques .PhD. The,sis, Arid Land Agricultural Graduated Studies and Research Institute, Agriculture in Desert and Salt Affected Areas, Faculty of. Agriculture, Ain Shams University, 2021.

The, data of. remote sensing has been used in all the, fields of. natural sciences and became an important tool in many research areas. Using remote sensing for identifying pollutants and polluted objects or materials is a new field of. remote sensing applications.

The, current study aims to assess pollution of. heavy metals for two important fruits for local consumption and exportation as well based on remote sensing technology. Six heavy metals were determined in the, lab and measured in the, field, the,y are nickel, cadmium, chromium, lead, zinc and mercury .The, citrus and mango farms in the, study area are closing to the, industrial area in South Giza governorate. This area is suffering from many sources of. pollution including factories, highways and bad drainage system in some areas.

The, first step of. the, process was to identify the, areas in which citrus and mango are cultivated and to create modified maps of land cover and crop production. The study area was revised using the Food and Agriculture Organization's (FAO) global land cover

classification scheme (FAO-LCCS). Using combined multispectral bands of sentinel-2 data acquired in 2018, land cover classification and crop pattern were performed. spatial resolution of ten metres. Geographic information system (GIS) was used to edit the, classification result in order to reach the, maximum possible accuracy. Based on the,se maps, the, study area was divided into six zones and the, locations of. the, observed sites were identified and covering variations within mango and citrus farms. From each location, spectral reflectances was measured and leave plant samples were collected from the, same trees for laboratory determination of. heavy metals. The, last step of. the, methodology was to statically correlate spectral reflectance characteristics in forms of. spectral vegetation indices and laboratory analysis of. heavy metals to produced models to estimate heavy metals using spectral data with adequate accuracy.

Irrigated herbaceous crops, irrigated tree crops, bare land, water sources, and artificial surfaces make up the total study area of 514425 feddans. GIS was used to provide the area of each land cover as well as geospatial data. Among predicted modelled heavy metals, the models were evaluated using coefficient of determination (R2) and root mean square (RMSE) error. The findings revealed that, correlation coefficient of. the, generated models, NDVI, Red, IR, Lic_1, VOG, RVI, SAVI, SIPI, and DWSI for predicting heavy metals in the, leaves of. mango and citrus. The, models could be applied in othe,r study area with similar conditions.

Keywords: Heavy metals, Hyper-spectral Vegetation Indices, Empirical models, Giza governorate.

LIST OF. TABLES

LIST OF. FIGURES

LIST OF. ABBREVIATION

ABBREVIATION	Mean
GIS	Geographic Information System
RS	Remote Sensing
Kg	Kilogram
mg	Milligram
µm	micrometer
IR	Infrared
GCP	Ground Control Point system
RMS	Root mean square
NDVI	Normalized Difference Vegetation Index
SPS	Statistical Package for Social Science
LCCS	Land Cover Classification system
Lic1	Lichtenthale Indices
VOG	Vogelman
Red	Ratios around red (ASD)
RVI	Mustard spinach
SAVI	Soil-Adjusted Vegetation Index
DWSI	Disease Water Stress Index
GIS	Geographic Information System

1. INTRODUCTION

As statistics of. 2014, the, total Mango area in Giza governorate is (7730) feddan produces aboot (23317) tons when the, total Citrus area is (13441) feddan, produces aboot (96776) tons. Due to the, combination of. agricultural, industrial and urbanization operations, the, governorate of. Giza is one of. the, most complicated regions in Egypt.

One of the most serious global environmental issues is human and ecological exposure to toxic waste from farming, manufacturing, military, and mining activities. Heavy metals, hydrocarbons and othe,r organic chemicals are of.ten included in the,se wastes. World Health Organization (WHO) identified thirteen (13) heavy metals that have a significant impact on the, environment as well as human health. The, Nickel, cadmium, zinc, lead, chromium, and silver are among these metals. Heavy metal music comes from a variety of places. Human exposure varies, but it is primarily due to mining and industrial operations, such as metal refineries, petrochemical processing, power plants, and electronics manufacturing. Diffuse sources, such as aging metal pipes, food contamination, sewage discharge, and leaching from landfills, can also cause contamination.Spatial variability mapping and spatial analysis is widely used when data is collected at different locations, such as heavy metal samples in order to provide surface continuous information and to obtain estimates for unmeasured positions.

Lead, from air and food is exposed to the, general public in approximately same proportions. Previously, lead in food was extracted from pots used for cooking and storage. Lead emissions