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GIS AND REMOTE SENSING IN ESTIMATION OF THE AGRICULTURE LANDS INFRINGEMENT, CASE STUDY: KOM HAMADA, BEHIERA

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ABSTRACT

The paper aims to assess agricultural land infringement using satellite images by applying three methods of classification: supervised (maximum likelihood), unsupervised and normalized difference vegetation index. To determine which sets of remote sensing satellite images were the best, they were compared. During the monitoring periods (2010–2011 and 2020–2021), Beban village is used as a study area. Landsat 8, Sentinel 2, Aster, and Modes satellite images are used to generate the remote sensing data. This period has been selected to classify images in order to assess land cover changes and the infringement of agricultural lands within Beban village and Kom Hamada center. The proposed methods employ the multi-spectral remote sensing data technique for land cover classification, with the selection of a satellite image dependent on the comparisons between the data quality of each satellite image downloaded for the study area. For land cover classification, some band combinations of the remotely sensed data are exploited, and the spatial distributions such as urban areas, agricultural land, and water resources are interpreted. The results give two important points: the Landsat 8 OLI/TIRS sensor is the best when compared with the other satellite, and the second point for the percentage of agricultural land in the study area in 2020, 2015, and 2010 was estimated to be 77.76%, 78.88%, and 84.04%, respectively. That is, agricultural land infringement accounted for 6.28% of Beban Village's total area.

Keywords: Remote sensing; Normalized Difference Vegetation Index; Digital image processing; supervised classification; unsupervised classification.

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1. INTRODUCTION

1.1 Background

In light of current economic conditions, the agriculture sector is one of the primary contributors to any nation's economic progress. But where it should be saving, the opposite occurs. In Egypt, there is a shrinkage in agricultural lands. The change in the state of agricultural lands can be followed by using recent programmers such as remote sensing and geographic information systems, in addition to collecting data through field trips. The Monitoring and assessing the state of the earth's surface is a key requirement for global change research. Classifying and mapping vegetation is a technical task for managing natural resources, as vegetation provides a base for all living beings. Vegetation mapping also presents valuable information for understanding the man-made and natural environments through quantifying vegetation cover from local to global scales at a given time point or over a continuous period [*Yichum Xie et al., 2008*]. Observation of land changes is an important factor for urban and environmental management. Automatically extracting land coverage and land use information from remote sensing images in a particular region, especially in a big urban area, is not an easy activity. Moreover, accurate information about the land cover of a region allows for the best possible management, planning, and monitoring of natural resources [*Abdul Baqi Ahady and Gordana Kaplan, 2022*]. Today, the strong progress in the remote sensing discipline allows exploiting a variant in the characterization of lineages [*Zakaria Adiri et al., 2017*]. The values of the NDVI have a range of (-1 to +1). In general, the result is positive, indicating that the cell has a plant cover, and the higher the resulting positive value, the greater the plant's greenery and density, and vice versa with regard to the negative values that indicate the non-green surface parameters. Therefore, the evidence of vegetative differences is used to distinguish between diseased and healthy plants [*M. F. Allawai and B. A. Ahmed, 2020*]. Used Geographic information systems (GIS) work well with remote sensing and the massive amount of satellite imagery. GIS is a computer-based system that deals with spatial data collection, storage, management, retrieval, conversion or changing, analysis, and modelling, and it provides the potential for mapping and monitoring the spatial extent of the built environment and the associated land use or land cover change. The acquisition, processing, integration, visualization, and utilization of various kinds of airborne or satellite-derived data constitute several important problems. The study target is the Behiera governorate; the Behiera governorate is one of Egypt's governorates, and its capital is the city of Damanhour, located in the west of the Delta. It is bordered to the north by the Mediterranean Sea, to the east by the Rashid branch, to the west by the governorates of Alexandria and Matrouh, and to the south by the Giza governorate. The area of the governorate is 9,826 km^2. Beheira Governorate is characterised by a diverse climate and geographical environment. The soil varies between sandy and heavy clay, and accordingly, the crops vary, which gives high

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productivity. Beheira Governorate participates in 1/6 of agricultural production at the level of the Republic, and the following crops are concentrated there: cotton crop, rice yield, wheat crop, corn crop, and fruit crops. The state has recently turned to some new agricultural methods to conserve water.

1.2 Motivation

Agriculture plays a significant role in the Egyptian national economy, so it must be developed through encourage the different reclamation agriculture lands. For successful agriculture it is required fresh water and fertile land, where was available in Egypt in near past. Now Egypt suffers from decreasing the Nile water quota and agriculture Lands Infringement. Egypt loses a remarkable percentage of agricultural land every year, making the nation's 3.1 million hectares of agricultural land prone "to total destruction in the foreseeable future". this paper introduces an approach with the help of recent technology represented in the use of remote sensing and GIS to confine the cultivated area in the study region that have been infringed estimation the amount of fresh water, which can contribute give a clear vision for the decision makers.

1.3 Related work

Land degradation is one of the root causes of declining agricultural productivity globally. Land Use and Land Cover (LULC) classifications have proven to be valuable assets in landscape characteristics and the changes that occur over time. There are many factors that can affect classification accuracy, including image data quality, the reliability of training and reference data, and the accuracy assessment method used (Robert C. Weih, Jr., and Norman D. Riggan, Jr.). Use satellite images to classify or identify areas related to mapping and vegetation monitoring in the region. Image processing is becoming increasingly important in agricultural applications [Roshan Shripad and Rambabu Vatti, 2017]. The vegetation measurable value cover is a widely used parameter in estimating agricultural loss [Mürvet Krc et al. 2014]. Satellite remote sensing has been playing a crucial role in forest monitoring and agricultural applications over the past few decades. Remote sensing images are expected to be produced by optical sensors with a good number of spectral bands and require tailored analysis depending on specific applications. In that case, a common approach in satellite remote sensing is to define various indices to aid in the classification of various land covers or plants under various stresses [Tianxiang Zhang et al. 2017]. Many studies have been published in the literature to evaluate the potential of detecting vegetation. The Normalized Difference Vegetation Index (NDVI) with a spatial resolution of 250 m was measured by the Moderate Resolution Imaging Spectrometer (MODIS) from December 2010 to May 2012. The results indicated that agricultural land degradation during 2011 was about 95269 feddan and changed to about 27000 feddan in May 2012. The highest land degradation was found in New Valley Governorate, and the highest impact was found in South Sinai Governorate, where it lost more than 10% of its total agricultural area [Khalil A.A., Y.H. Essa, and M. K. Hassanein, 2014]. The United States Geological Survey (USGS) manages all the data from satellite images: Landsat, Sentinel, Aster, Modis, and others. Landsat 8 is the new generation of the series of Landsat satellites. It was launched in 2013 and the data are characterized by a high radiometric resolution (16 bits) and the scenes cover 185 x 180 km. It is carried by two sensors, namely the OLI (Operational Land Imager), which is characterized by 9 spectral bands: 4 in the visible (VIS) (0.43–0.67 mm), 1 band of the near infrared (NIR) (0.85–0.88 mm), 2 bands of the SWIR (1.57–2.29 mm), and 1 band of cirrus (1.36–1.38 mm) (spatial resolution of 30 m), and In addition, it has a panchromatic band (0.50–0.68 mm; spatial resolution of 15 m). TIRS (Thermal Infrared Sensor) is the second sensor with two bands of 100 m in spatial resolution, operating between 10.60–11.19 mm and 11.50–12.51 mm, respectively [Zakaria Adiri et al., 2017]. In other hand The Sentinel-2 mission by the European Space Agency (ESA), the European Commission, and industry comprises two identical satellites positioned at 180 degrees to each other. Sentinel-2 performs terrestrial observations for applications such as agriculture, land-cover mapping and change detection, forestry, and environmental monitoring.

Sentinel-2 Bands	Central Wavelength (µm)	Resolution (m)
Band1 - Coastal Aerosol	0.443	60
Band2 - Blue	0.490	10
Band3 - Green	0.560	10
Band4 - Red	0.665	10
Band5 - Near Infrared	0.705	20
Band6 - Near Infrared	0.740	20
Band7 - Near Infrared	0.783	20
Band8 - Near Infrared	0.842	10
Band 8A - Near Infrared	0.865	20
Band 9 - Water Vapour	0.945	60
Band 10 - Shortwave Infrared (Cirrus)	1.375	60
Band 11 - Shortwave Infrared	1.610	20
Band12 - Shortwave Infrared	2.190	20

Landsat 8 Bands	Central Wavelength (µm)	Resolution (m)
Band1 - Blue	0.443	30
Band2 - Blue	0.483	30
Band3 - Green	0.563	30
Band4 - Red	0.665	30
Band5 - Near Infrared	0.865	30
Band6 - Shortwave Infrared	1.610	30
Band7 - Shortwave Infrared	2.200	30
Band8 -Panchromatic	0.590	15
Band 9 -Cirrus	1.405	30
Band 10 - Thermal Infrared	10.9	100
Band 11 - Thermal Infrared	12	100

Fig. 1: Bands of Landsat 8 and Sentinal 2

Many research have looked at how to identify vegetation in various satellite images. For instance, [Tianxiang Zhang, and et al. 2017] employed a variety of indices to evaluate the features of the soil and vegetation in satellite remote sensing applications. Certain indices, like NDVI and NDWI, are determined by the sensitivity and importance of particular bands. The first method, which the author analysed, uses conventional indices, while the other two use complete bands and specific bands (Red, NIR, and SWIR), respectively, of on-board sensors. It is

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demonstrated that compared to the one employing indices, a superior classification performance can be attained by directly using the three selected bands, and that using all 13 bands can further improve the performance. It is advised that the new methodology be used for Sentinel- 2A picture analysis and other extensive applications. Whereas [Roshan Shripal, Rambabu Vatti, 2017] employed remote sensing technology, a crucial tool in examining the earth to find areas of vegetation. summarises how these classification techniques can be applied to image processing to locate vegetation regions. Scilab has the overall procedure implemented. For reliable land cover extraction from remote sensing data, other studies examine, analyses, and score the performance of four classification algorithms, including ISODATA, K-means, pixel-based, and segment-based classification techniques. The classified photos were verified using ground control points from field trips, the Digital Globe, and Google Earth Pro in addition to the Google Earth Pro and the Digital Globe. Using ISODATA, K-means, pixels, and segment based classifications, the total accuracy was 81.82%, 77.27%, 92.42%, and 87.88%, respectively. The outcomes showed that the classification method based on pixels performed better in terms of total accuracy and kappa coefficient. In 2021, Soha A. Mohamed in Egypt, agriculture is the most significant human activity and the most significant social and development sector; it grew both during and after the 2011 revolution. There is some research being done on this phenomenon and its effects, such as that done by Mahmoud M. Fawaz et al. (2020) in the study target Kafr El-Sheikh Governorate on the loss of net agricultural income for the following crops: wheat, sugar beet, clover, clover tahreesh, broad beans, onions, flax, potatoes, and tomatoes at 8.5, 33.0, 75.9, 7.7, 0.15, 0.40,. Using the Moderate Resolution Imaging Spectrometer (MODIS) and the Normalized Difference Vegetation Index (NDVI) with a spatial resolution of 250 m, the study [Khalil A.A., Y.H. Essa, and M. K. Hassanein, 2014] is primarily focused on monitoring and assessing agricultural land degradation in Egypt from December 2010 to May 2012. The findings showed that in May 2012, agricultural land degradation had decreased to approximately 27000 feddan from approximately 95269 feddan in 2011. The South Sinai Governorate, which lost more than 10% of its total agricultural area, saw the greatest damage and the highest levels of land degradation. This study evaluated the infringement of agricultural lands and cover changes in Beban., Kom Hammada center by using different set of Remote Sensing Satellites images and Geographic Information Systems (GIS) during the period (2010–2011and 2020-2021). The method employs the multi-spectral remote sensing data technique to find spectral signature of different objects such as vegetation index, land cover classification, and urban areas.

2. STUDY AREA

Beban Village is taken as a sample of the study area, where it is one of the villages of the Kom Hamada Center in the Behira Governorate. The total area of Beban Village estimated by 2344 feddan. The main activity of the village is the agriculture. Where the main crops are: Cotton,

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rice, corn, wheat, onions, greens, citrus and palm. The sources of the irrigation water are Canal branching from the Nubaria Canal. Some farms belong to the village.

Fig. 2: Study Area; Beban Village in Behiera Governorate

3. MATERIALS AND METHODS

3.1 Material

- Survey Maps for the study area
- Software Used
  - Landsat Image
  - ArcGIS 10.8 (Arc Map)
  - Global Mapper
- Hardware Used
  - Laptop Computer
  - 16 gigabyte memory card
  - Hp Laserjet 2014 Printer (Print for proof reading)

3.2 Methods

The process in the method depending on three branches depending of each other. The first one; make Land cover change of the study area from 2010 to 2020 to define the starting of change and comparison between downloaded images for the Beban village from five different satellites; Land sat 7, Land sat 8, Aster, Modis, and Sentinal 2 to select the more images are clear and reflect the actual situation in the study area. Secondly; gathering the data which is represented in land survey maps, satellite images and measured data collected from field trips. Preparing the

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study area as shape file format to make the analysis on GIS, Enter the extracted data from satellite images as layers on GIS. Thirdly; applying LULC classifications by using the three methods; Normalized difference vegetation index (NDVI) equation and land cover classification vegetation index, Spatial classification supervised and unsupervised.

3.2.1 Monitoring of the Land cover change in study Area

On Google earth program showing the historical imagery by using time slider to define the starting time to start the monitoring of vegetation detection in Beban village and making an inventory of the currently planted area and identifying the areas that have been infringed, during the period from 2010 to 2021.

3.2.2 Collected Data from field visits

In addition the downloaded images from different satellites, Next table tabulated the different data which are get it from the Agricultural Association of Beban, this data will be used for verification of the results from different classification methods

Table 1: Beban Agriculture Associate, 2020

The Study Area +	Area in Feddan	Area in acre	Area in km^2
Total Area of Beban	2344	984.5	9.84
Area of services	2079	873.18	8.73
Cultivated Area	2009.9	844.2	8.44
Infringement Area	69.15	29.043	0.29

3.2.3 LULC Classifications

- *Supervised and Unsupervised Classifications*

The LULC is mean; the process of appointing land cover classes to pixels and categorize them. For water, metropolitan, woodland, horticulture, buildings, woodlands, agriculture, grasslands, mountains, and highlands. Where the goal of picture grouping is to naturally arrange all pixels in a picture into land cover classes or subjects. That is, diverse component types show a distinctive blend of dependent on their intrinsic otherworldly reflectance. In more detail, which will be occurred in current study; classifying multispectral images into patterns of varying gray or assigned colors that represent either clusters of statistically different sets of multiband data (radiances expressed by their DN values), some of which can be correlated with separable classes/features/materials (Unsupervised Classification), or numerical discriminators composed of these sets of data that have been grouped and specified by associating each with a particular

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class. whose identity is known independently and which has representative areas (training sites) within the image where that class is located (Supervised Classification). In an unsupervised classification, the objective is to group multiband spectral response patterns into clusters that are statistically separable. Thus, a small range of digital numbers (DNs) for Agriculture lands, buildings, and the drainages and canals, can establish one cluster that is set apart from a specified range combination for another cluster. Separation will depend on the parameters we choose to differentiate Classification in remote sensing images involves clustering the pixels of an image to a (relatively small) set of classes, such that pixels in the same class are having similar properties. Image classification majority is based on the detection of the spectral response patterns of land cover classes. Classification depends on distinctive signatures for the land cover classes in the band set being used, and the ability to reliably distinguish these signatures from other spectral response patterns that may be present. In supervised classification; statistical classification requires relatively long calculations, especially if the ranges used in the classification are many, the training areas for the classification categories are distributed in the histograms of the type of normal distribution. Means and Variances of classification categories are used to calculate probability values for each cell of the image to determine its category. Next flow chart represents the two types of classifications which occurred on the study area by using GIS.

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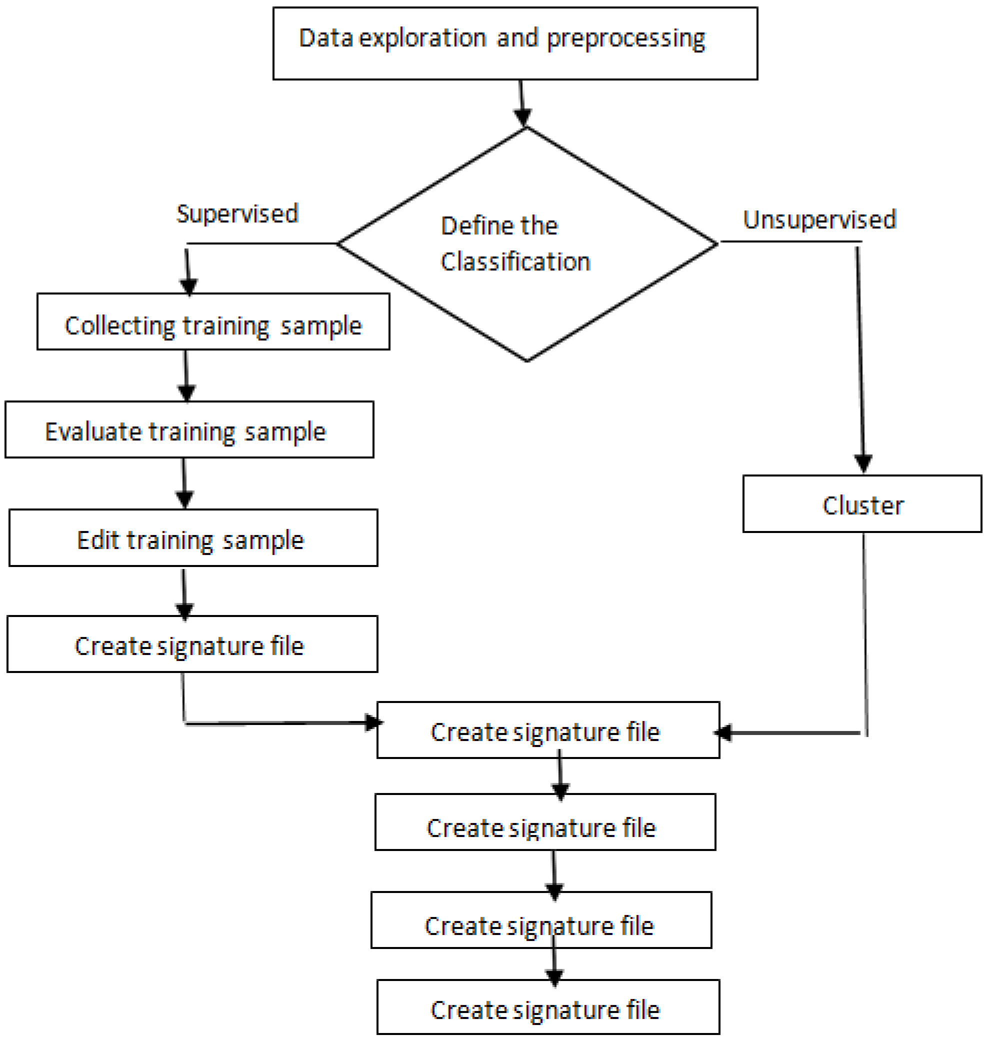

Fig. 3: flow chart of supervised and unsupervised of classification

- *Normalized Difference Vegetation Index Classification (NDVI)*

An indicator that represents an indication of the density of vegetation cover and depends on its calculation on the variation of the interaction properties of chlorophyll present in the plant with electromagnetic radiation and is widely used in monitoring drought, monitoring and forecasting agricultural production. NDVI, a ratio (reflectance difference) of the near infrared (NIR) wavelength band and the visible red band, identifies the “greenness” of vegetation, making it a useful tool to highlight vegetation cover density. The positioning of the two bands changeable according to the version of the satellite. The formula for land sat sensor OLI_TIRS (Landsat – 8) can be writing as follows:

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$$\text{NDVI} = \frac{Band\ 5\ (NIR) - Band\ 4\ (R)}{Band\ 5\ (NIR) + Band\ 4(R)}$$

4. DISCUSSION AND ANALYSIS

4.1 Monitoring the land cover in Study Area to select the suitable period

By using the historical imagery in Google earth pro, moving between the acquisition date, the land cover changing of the concerned area are recorded from 2000 to 2020, figure 4 represents that, where the historical image of Behiera governorate shows the change start after 2013, but is very clear in last recent years; 2018, 2019 2020. So the satellite images downloaded will be considering from 2014 to 2020.

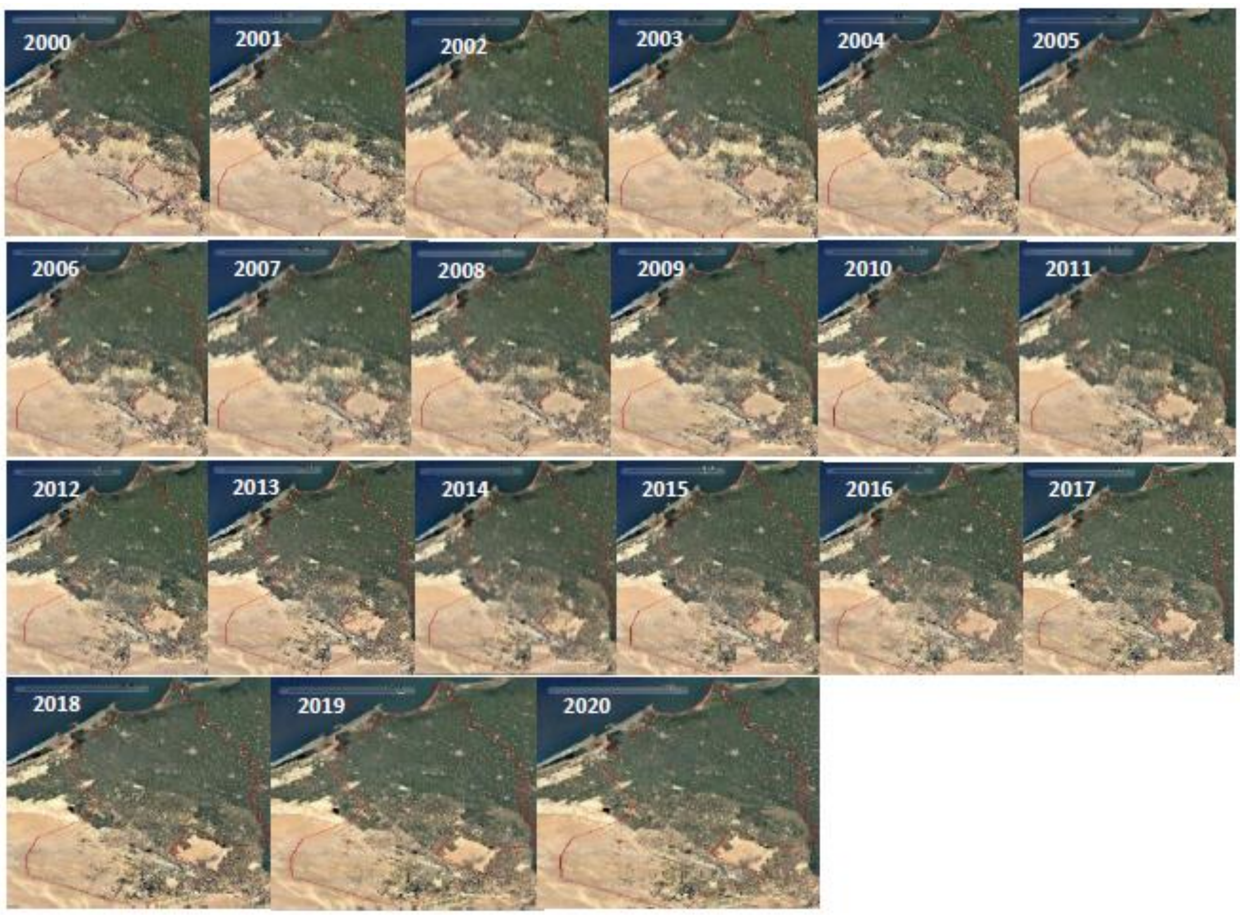
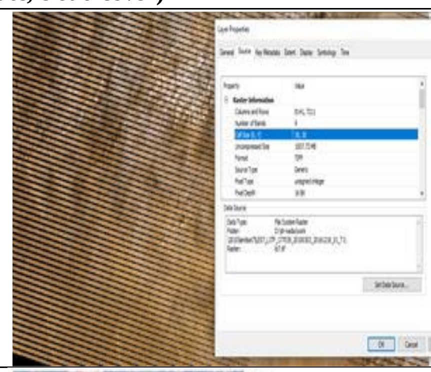
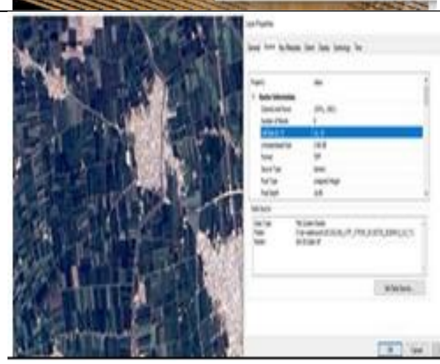


Fig. 4: Land cover change in Behiera Governorate from 2000 to 2020

4.2 Satellite images download and Comparison

Five Satellites are used to download the images of study area; Land sat7, Land sat8, Sentinal2, Aster, and Modis, the images detail of every satellite and the comparison between the images detail as following in table 1. With analysis of the row data from the image, it is founded; Landsat 8 is the more suitable, where its technical specification of image is the most suitable of the objective of the study because the image is clear and the resolution is high, the image is added with ensuring to add all bands where image of landsat8 contains 11 bands, Infrared Band take the number 5 and 4 for the Red Band.

Table 2: Different Satellite Images and their Details

Sat. name	Sensor	Resolution	Image and its Details (, Acquisition date, cloud cover)
Land sat7	ETM+	30 *30	- Cloud Cover;: 1.00 - Acquisition date: 2020/04/24 -Sun Elevation: 59.35168165 -The appearance of some black lines in the satellite video, which indicate the lack of some data in it, as well as the resolution of the visual. -Number of bands in the image is 8 
Land sat8	OLI_TIRS	20 * 20	- Sun elevation; 63.26159789 - Acquisition date: 23/4/2020 -Cloud Cover: 0.73 -The image is very clear and the resolution is high, moreover it can be increased to (15*15) by using the technical specification of Band 8. -Number of bands of the image is 11 
Sentinal2		20 * 20	- Acquisition date: 23/04/2020 -Cloud cover: 0.345687 - Number of bands of the image is 12 -the images are not available in theconcerned date. 

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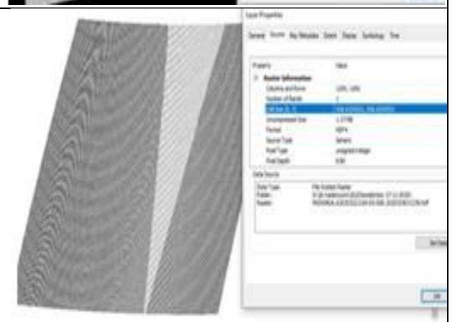
Aster	Aster	90 * 90	-Cloud cover:: ----- - Acquisition date:: --- -Sun Elevation: --- -There are two technical points caused to decreasing the usage its images in the study; resolution is not suitable and the image is not correct. -Number of Bands of the image is 14 
MODIS	versatile sensors	250 * 250	- Cloud cover: Not all MODIS datasets provide a cloud cover value. -- Acquisition date: 2020/01/01 -Sun Elevation: ----- -the required resolution of the image for the objective of the study is verypoor. -Number of Bands of the image is 

4.3 LULC Classifications

The image included 8 bands from 1 to 7 for the analysis, and band 8 used in enhancing the resolution through Pan Sharpen tool. The process started by The RGB composite of the row image which was in pixel 30x30 and modification occurred pixel size 15 x 15 to be more clear and obtain the natural colors. With noted in Land sat8 the order is; 4 for Red, 3 for green, and 2 for blue and gave the output and saved as TIFF/GEOTIFF. To start in classifications, study area most be define and activated, this process started by extracted borders of Behira Governorate and Beban village is extracted from Google Earth and Converted them to shape files to deal with GIS. The spectral signature for different objectives in the image is occurred. A classification process based on information about the spectral characteristics of the land cover in the confined area, where the images are analyzed by define selected areas on the image for each type of land cover, which are also called "orientation samples" and it is preferable that they be distributed over the study area, and then a symbol or A color for each region that represents one of the land cover classes, resulting in a thematic map.

4.3.1 Unsupervised Classification

The classification occurred for image of year 2020. Where K-means clustering algorithm that selects the cluster centers that minimize the within-cluster variance is used. Reclassify the different classes in the image to be three land cover types of study area (Beban village). Three trials are taken place to achieve the reclassify. Started by 15 classes, and reduced to 10 classes,

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then reduced to 8 classes, and finally reduced to 5 classes, the results for all trials is the same only one class in cluster grid. So, in this type of classification Kom Hamada Center in the Behira Governorate is taken as study area and the all process are repeated, to get a good result. Finally the calculation of agriculture get it from converted the image to polygon, next figures showed the different steps. The obtained area from this classification covered all region included the agriculture area tabulated in table 3

Table 3: Agriculture areas from Unsupervised Classification 2020

	2020
Name of the study area	Biban village, affiliated to Kom Hamada district, Behira governorate
Area of the study area in square kilometers	6.468378 km^2
Area of agricultural area in square kilometers	5.513383 km^2
Area of building in square kilometers	0.829784 KM^2

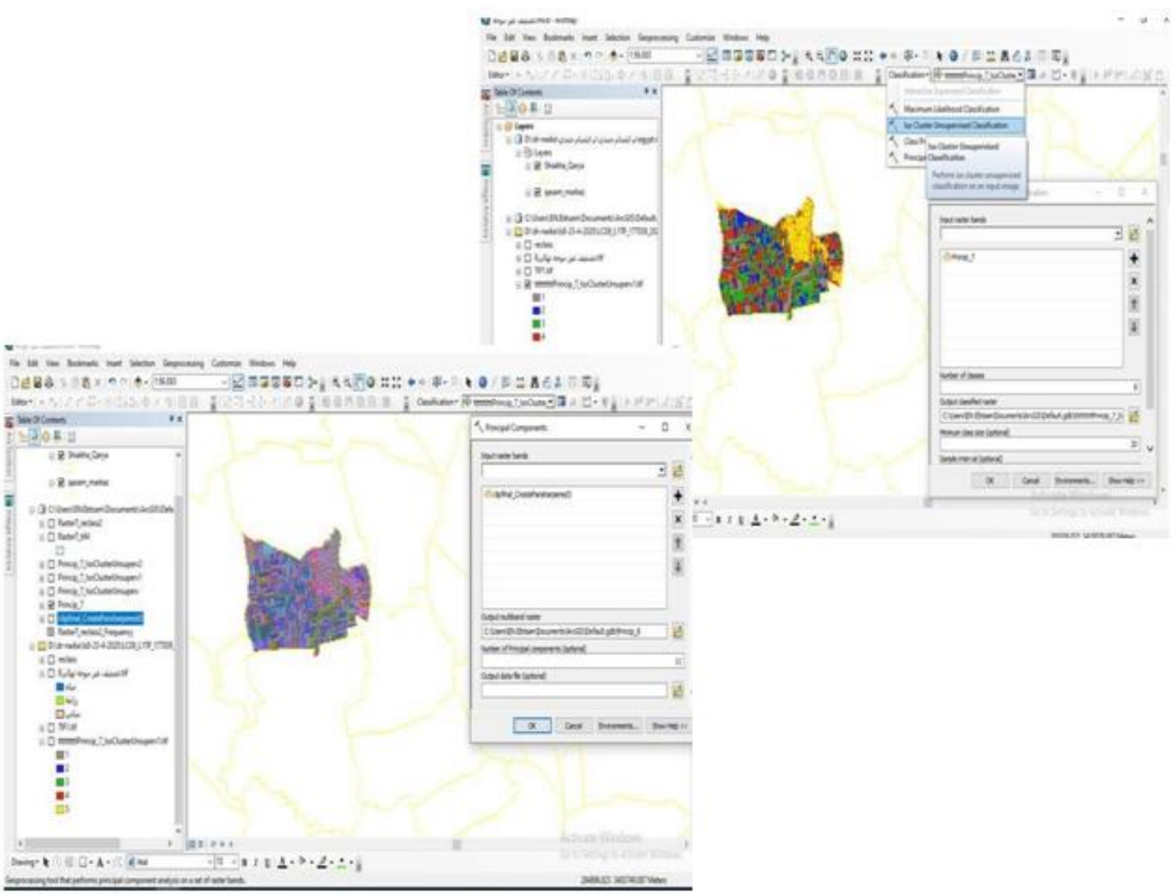

Fig. 5: Unsupervised Classification onBeban Village

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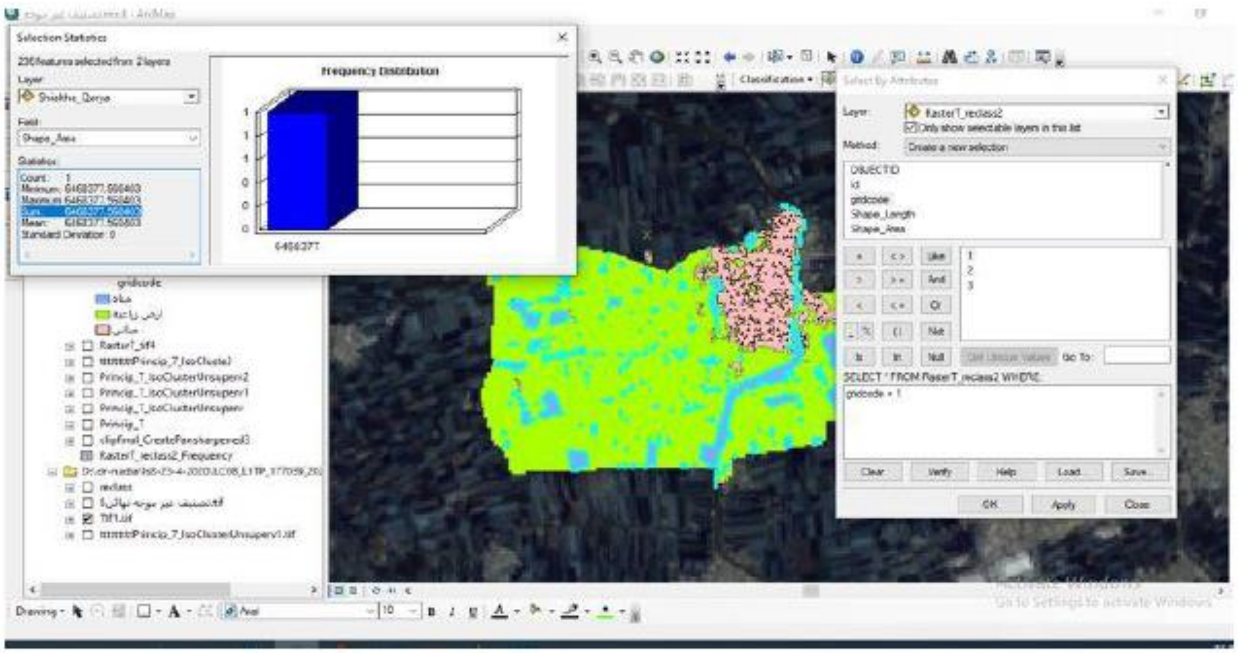

Fig. 6: Agriculture Area from Unsupervised Classification

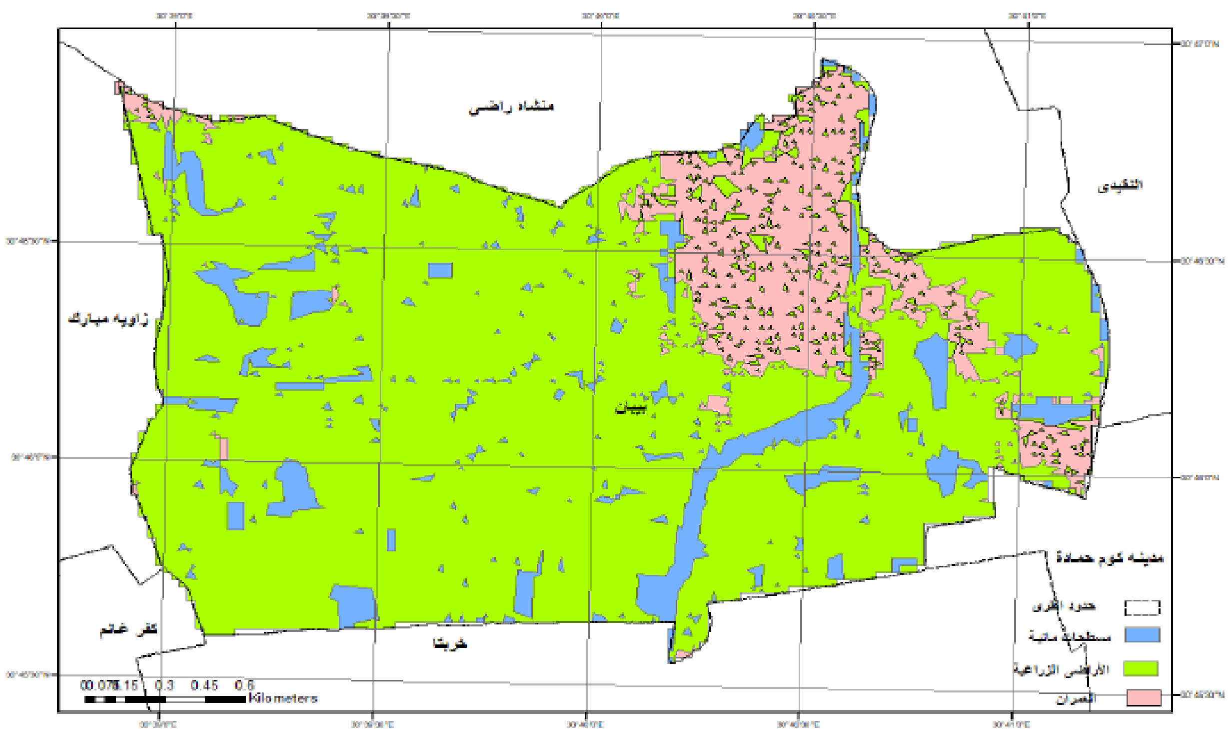

Fig. 7: Agriculture Area from Unsupervised Classification

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4.3.2 Supervised Classification

A continuation to some of the previous steps that were taken in the unsupervised classification, such as displaying the selected and activated images after the composited process and enhancing. In this type of classification, the spectral signatures is obtained from training samples to classify an image. Where Maximum Likelihood Classification was adopted, then creation of signature file from the training samples, where calculation of the probability value of each cell of the image, and therefore the application of this method, which is used by the Spatial Analyst multivariate classification tools to classify the image. Then the Merge of Training Samples occurred by using Training Sample Manager. The training samples occurred for every class from the three classes in the image; Agriculture areas, urban areas (buildings), canals and drainages. Distribution in the histograms is of the type of Normal Distribution. For the value of probabilities for each cell of the image, where, the data of training areas are used to calculate the means and variances for the classification categories. For the classification categories, the probability values for each cell of the image are used to determine its category. Scatter plots to compare a band of visuals to show homogeneity in the process of selecting training areas in all charts, whether in the first, second, and third bands (red, green, and blue). The obtained area from this classification covered all region included the agriculture area tabulated in table 4

Table 4: Agriculture areas from Supervised Classification 2020

	2020
Name of the study area	Beban village, affiliated to Kom Hamada district, Behira governorate
Area of the study area in square kilometers	6.468378 km^2
Area of agricultural area in square kilometers	5.265201 km^2
Area of building in square kilometers	1.133075 KM^2

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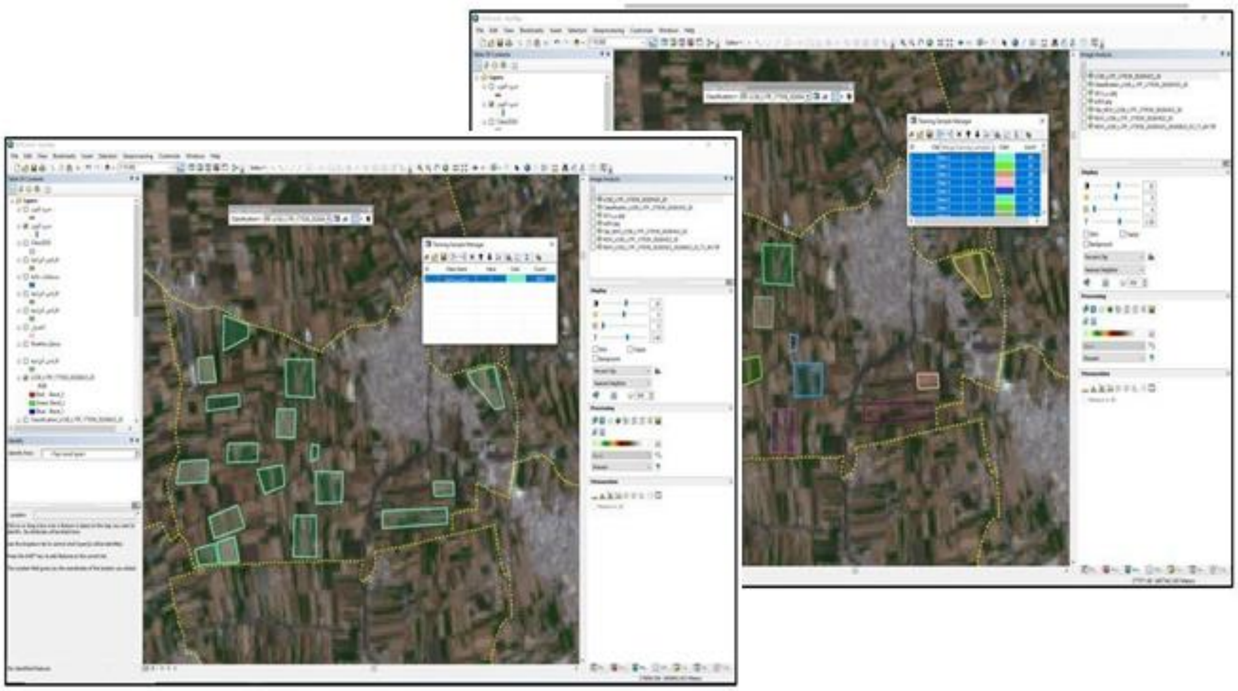

Fig. 8: signature step of Supervised Classification

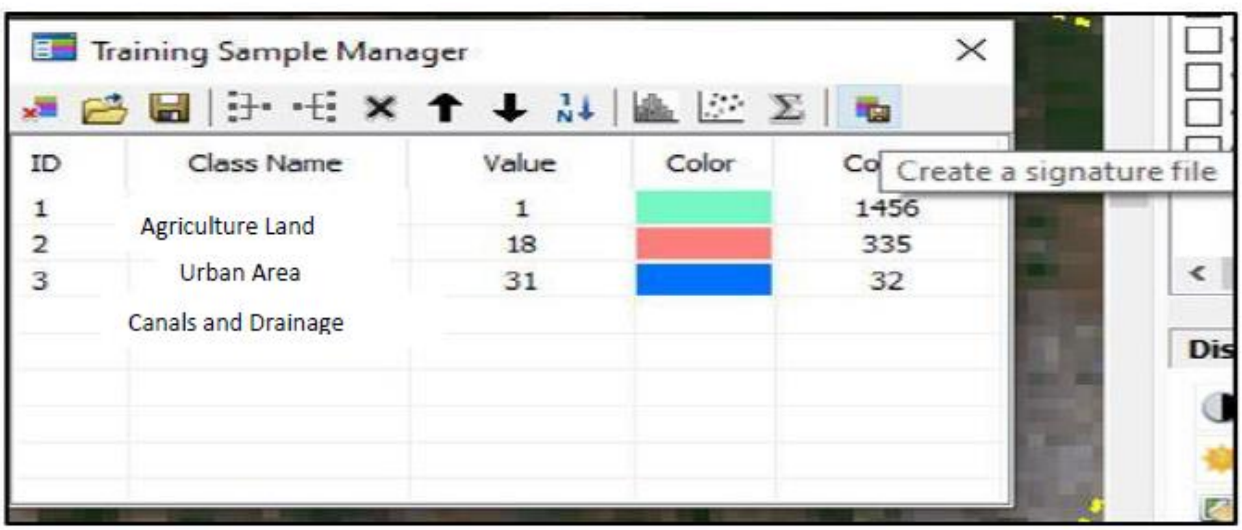

Fig. 9: Training sample of the three classes

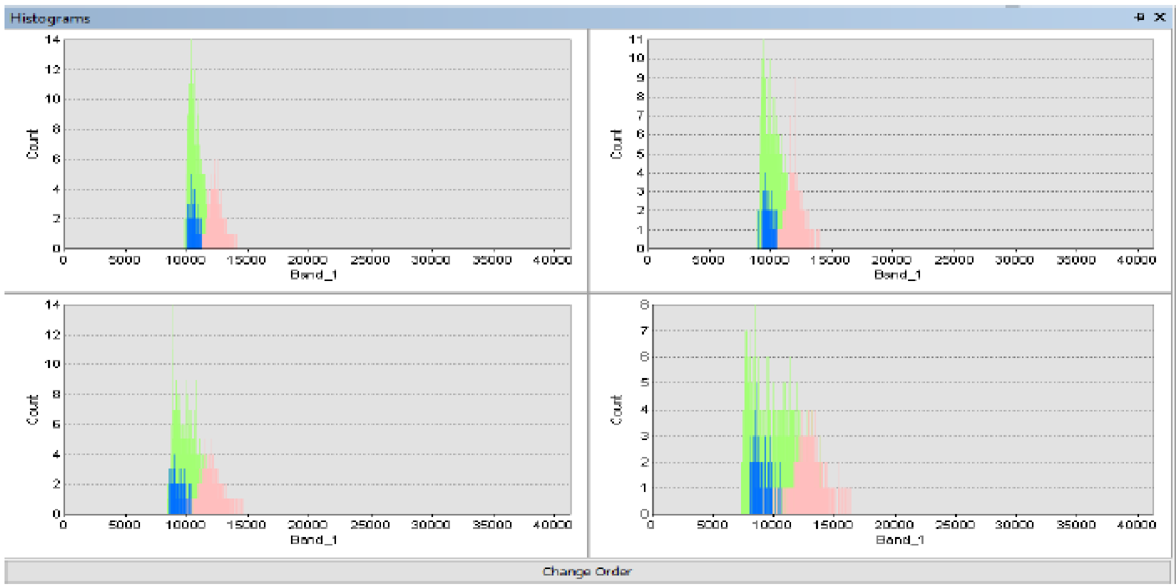

Fig. 10: The histogram of agriculture area, canals and drainage, and building

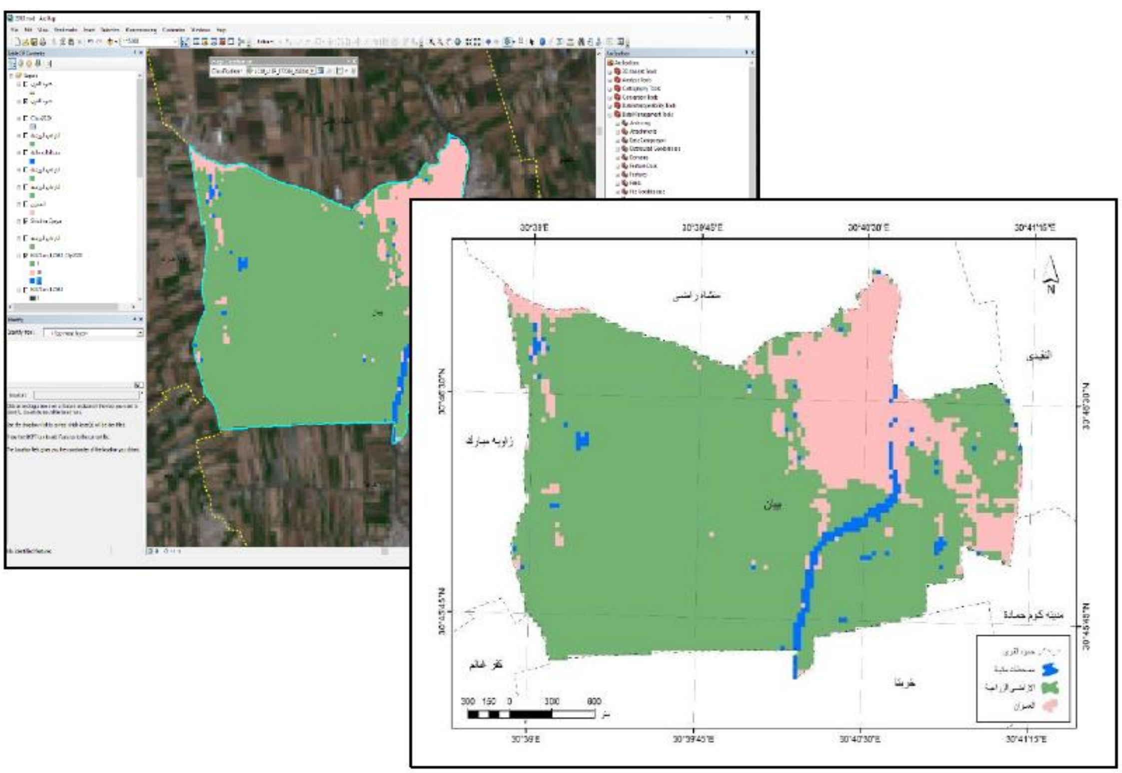

Fig. 11: Agriculture Area after Supervised classification

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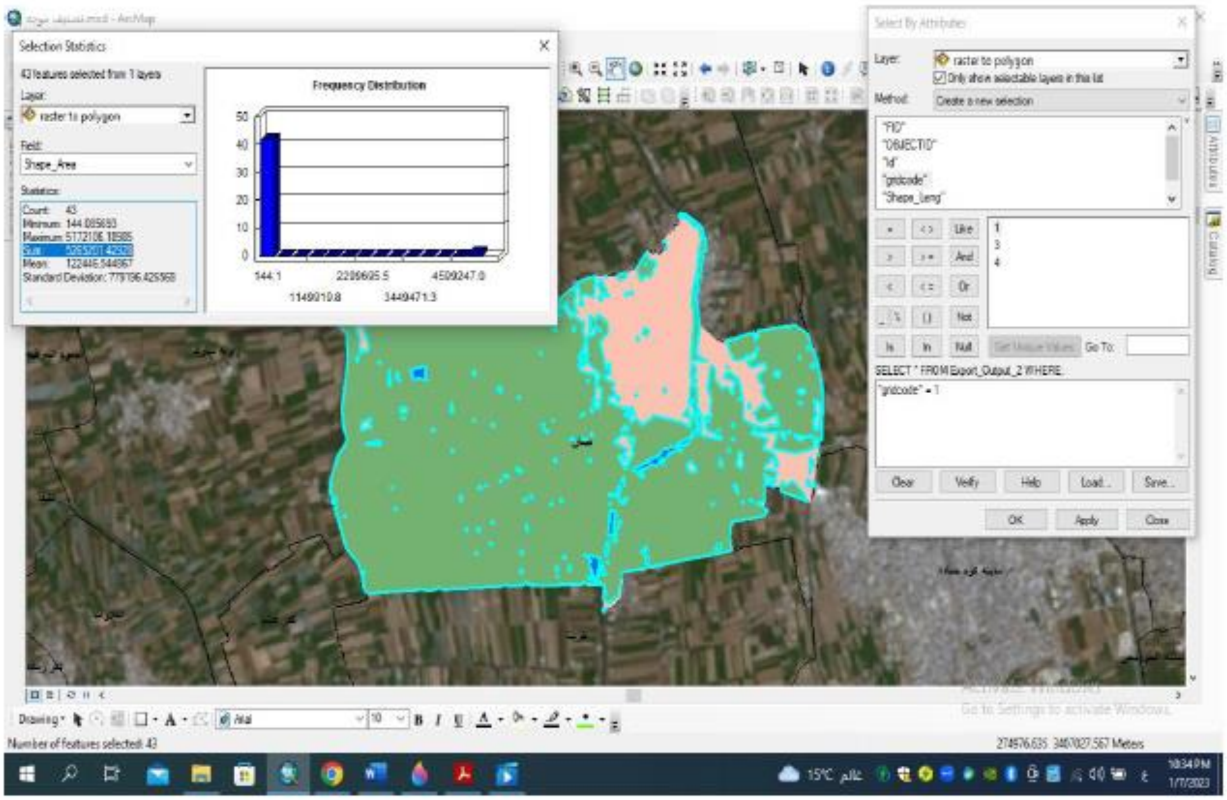

Fig. 12: Agriculture Area from supervised Classification

4.3.3 Normalized Difference Vegetation Index Classification (NDVI)

This type of classification is easily calculated using the reflectance images of the scene in red and infrared bands. It permits to detect the vegetation areas (agriculture areas in Beban village) as well as to distinguish waters (canals and agriculture drainages) and soils (buildings, and roads). The bands 4 and 5 from Images supplied by Landsat 8 OLI (Operational Land Imager) sensor it be used for NDVI calculation. The value of NDVI ranges between (1 and -1), while between (1 and 0) it represents healthy vegetation cover and vegetation areas, while between (0 and -1) it does not represent vegetation, it represents anything that does not contain chlorophyll such as empty lands and areas water and urban. The following step is the classification, the image Classified into five categories, then the clip of study area and make the polygon to calculate the different areas. This process occurred on the study area for three separate images for years; 2010, 2015, and 2020. Where the final results of the three years tabulated in table 5.

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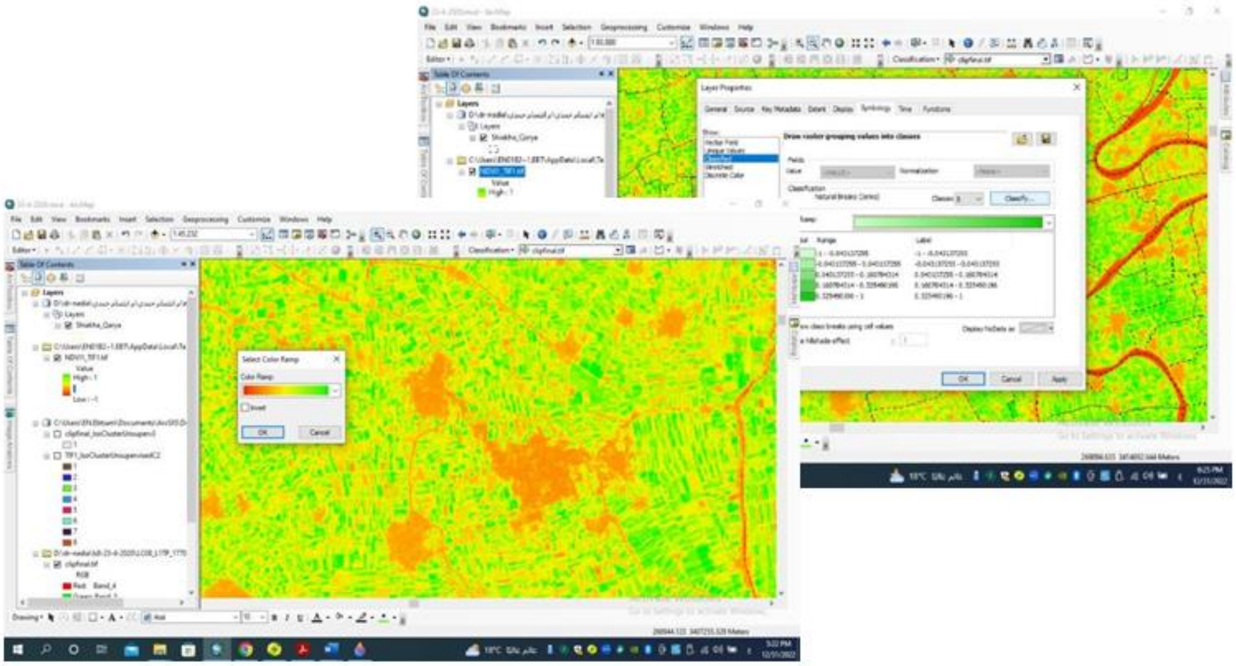

Fig. 13: supervised Classification on Beban Village

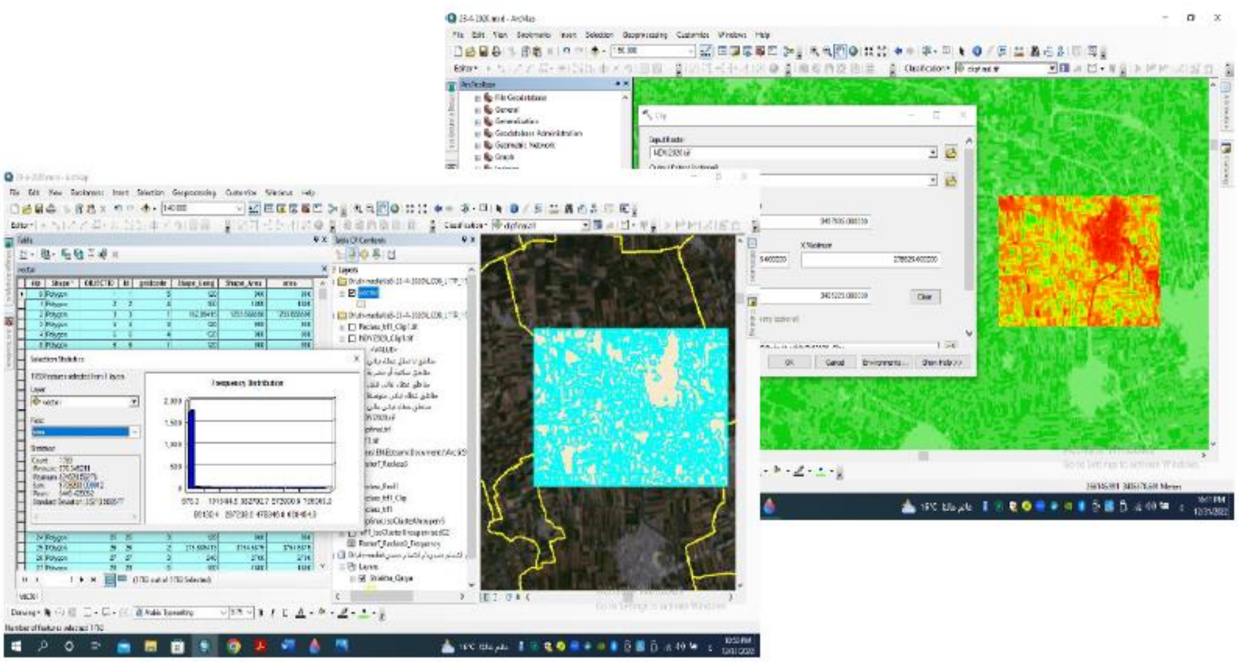

Fig. 14: Agriculture Area after NDVI classification

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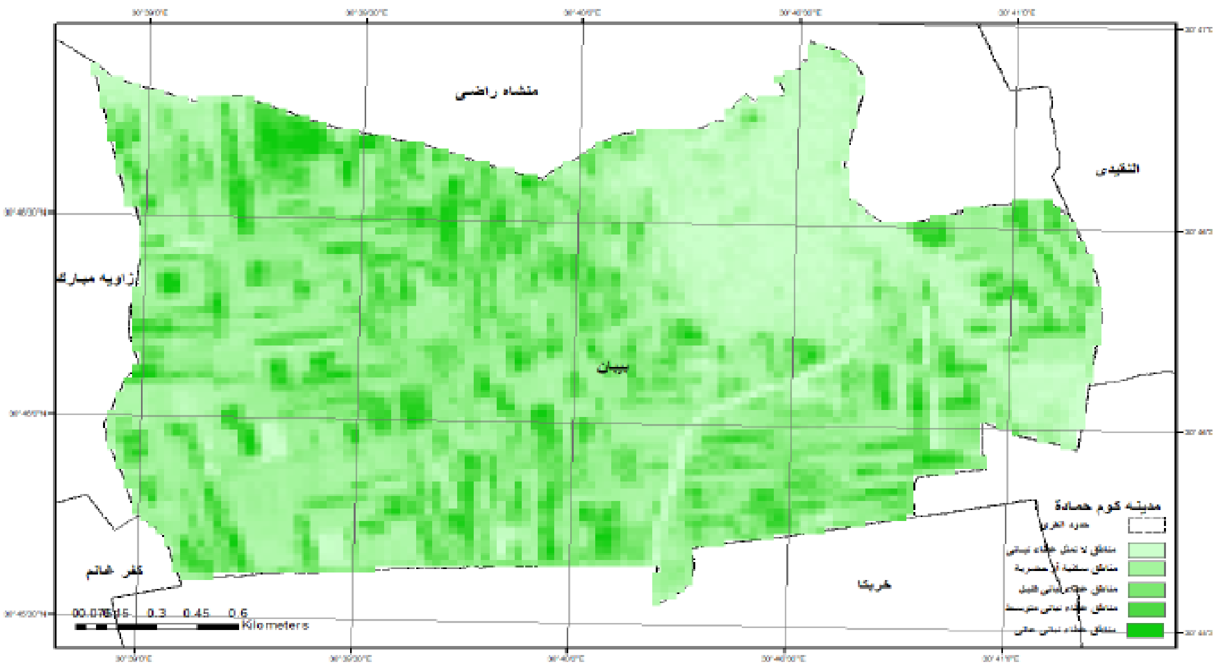

Fig. 15: Agriculture Area after NDVI classification

Table 5: Agriculture areas from NDVI for 2010, 2015, and 2020

	0101	0102	0101
Name of the study area	Biban village, affiliated to Kom Hamada district, Behira governorate		
Area of the study area in square kilometers	6.468378 km^2	6.468378 km^2	6.468378 km^2
The area of the study area in acres	1598.371 acres	1598.371 acres	1598.371 acres
Area of agricultural area in square kilometers	5.434585 km^2	5.102383 km^2	5.02999 km^2
Area of agricultural area in acres	1342.91527 acres	1260,826 acres	1242,937 acres
Percentage of the agricultural area out of the total area of the study area	84.02%	78.88%	77.76%

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5. CONCLUSIONS AND RECOMMENDATIONS

Three variance methods of classifications the cultivated area in Beban village, Land sat8 Images is selected after the comparison between five satellites. The images downloaded for three years; 2010, 2015 and 2020. from USGS site to study the Agriculture Lands Infringement in the village, land cover change detection from Google Earth are used for the period from 2000 to 2020 to determine the most obvious period of change, which is founded after 2014. The results showed that; Comparison between 5 images of satellites on the clear and accurate data for the study area which result the Land sat 8 is the most images to fit the study. The result of the study gives; percentage of the agricultural area out of the total area of the study area year 2020, 2015, and 2010 estimated by; 77.76%, 78.88%, 84.04% respectively. this paper give the decision makers clear vision about the current situation, and help in Estimation the amount of water for irrigation suitable for the current conditions and the type of crops can be impacted by this loss of these value of cultivated area.

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