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# LAND SUITABILITY ASSESSMENT FOR SOME SPECIFIC CROPS USING REMOTE SENESING AND GIS IN EL-QAA PLAIN, SOUTH SINAI, EGYPT.

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## ABSTRACT

In Egypt, the excessive population growth and the lack of food security were the guide to increase production in unit area, expand the cultivated land horizontally, and to utilize the land with respect to its potentiality in an appropriate way. Therefore, this study aims to integrate soil qualities (or characteristics) with remote sensing data and Digital Elevation Model (DEM) into a Geographic Information System (GIS) to produce a database for the land resources and the soil map, and assess the current and potential suitability of some specific crops in El-Qaa plain, South Sinai, Egypt. Two SPOT5 images were classified using unsupervised classification technique. The base map of the study area was used in the field to check, confirm, correct and modify the physiographic mapping unit boundaries. Four sample areas were selected. 26 soil profiles were taken to represent the different mapping units in the study area. Morphological description and soil sampling were collected for laboratory analyses. The physiographic units were classified into subgroup level on the basis of the key to soil taxonomy. the results show that soils in the study area include: sand sheet (Low, moderate, and high) classified as Typic Torripsamments and Typic Haplosalids, Bajada classified as Typic Torripsamments and Sodic Haplocalcids, Basin classified as Typic Torriorthents, Wadi classified as Typic Torripsamments and Sodic Haplocalcids, Dry sabkhas classified as Typic Aquisalids, and Wet sabkhas classified as Sodic Psammaquents. The main land qualities of the different mapping units were selected and crop requirements of 21 crops were rated and matched to obtain the current and potential land suitability. The suitability of the selected crops currently not suitable in the different mapping units. The main limiting factors are texture, salinity and alkalinity, nutrient availability and calcium carbonate content, only in sabkhas added flooding, drainage, and soil depth. The potential suitability in the different mapping units refers that soils can be highly (S1), moderately (S2), and marginally (S3) suitable with a proper management practices and fertilization, and can not be suitable due to soil texture in all mapping units except in sabkhas where the limiting factors are texture, salinity and alkalinity, flooding, drainage, and soil depth which can not be enhanced in the near future. The results obtained can be employed by landuse planners (decision makers) to select areas suitable for the selected crops production.

**Keywords:** Soil mapping, Soil Quality, Land use requirement, Land Suitability, Remote Sensing, GIS, South Sinai.

## INTRODUCTION

In Egypt, the excessive population growth and the lack of food security were the guide to increase production in unit area, expand the cultivated land horizontally, and to utilize the land with respect to its potentiality in an appropriate way. Sinai Peninsula could be considered as one of the most promising areas for sustainable development. Under these circumstances, the government of Egypt decided to implement the "National Plan for Development of Sinai" (NPDS). The plan aims at achieving comprehensive development of Sinai over the period from 1994 to 2017. EL-

Qaa Plain is ranked as the high priority development area in South Sinai, which has from the natural resources what makes it able to begin new societies (agriculture, industry, tourism,...etc.). The desert immigration is considered to be the core resolution to re-draw the demographic map of Sinai Peninsula which is important for the national security of Egypt. Sustainable agricultural development is important issue to face the increasing population with the limitation of natural resources. Therefore, the policy of the horizontal expansion of agricultural land represents a very great importance for Egypt. Moreover, optimal landuses and the good management practices must be studied to select and put into practice those landuses that will best meet the needs of the people while safeguarding resources for the future generations for the biggest achievement of sustainable agricultural development. Land suitability classification is the process of appraising and grouping specific types of land in terms of their absolute or relative suitability for a specific kind of use. Qualitative suitability classification as an empirical assessment is based on assumed relationships being defined as a variable, which may be land quality, land characteristics or function of several land characteristics that has an understood influence on the output from or the required inputs to a specific kind of land use FAO (1976). Land evaluation approach is based on the matching of qualities of different land units in a specific area, with the requirements of actual or potential land use. The results of land evaluation should be useful for rational land use planning FAO (1993).

This study aims to integrate soil qualities (or characteristics) with remote sensing data and Digital Elevation Model (DEM) into a Geographic Information System (GIS) to produce a database for the land resources and the soil map, and assess the current and potential suitability of some specific crops in El-Qaa plain, South Sinai, Egypt.

## MATERIALS AND METHODS

**Study area**

El-Qaa plain is located between longitudes 33° 20' - 34° 10' E and latitudes 27° 46' - 28° 41' N with total area of about 1742.6 $km^2$ (Fig. 1). The plain is bounded from the north by Wadi Feiran, from the east by mountainous area of south Sinai, from the west by the Gulf of Suez, while towards the south; it is limited by the red sea. The plain rises up to 200 m above sea level (asl), sloping gently towards the southeast of the peninsula (Fig. 2). El-Qaa plain could be considered as one of the driest parts of Egypt (Ayyad and Ghabbour, 1986). Soil temperature regime is Hyperthermic and the soil moisture regime is Torric except for soils that have high water table, soil moisture regime is Aquic. The southern mountainous massif is a triangular mass of mountains with its apex at Ras Mohammed to the south, formed of igneous and metamorphic rocks, chiefly granites; it is intensively rugged and dissected by a complicated system of deep Wadis (Said, 1962; 1990). The geomorphology of El-Qaa Plain in general has been described briefly as: a) The Eastern Mountainous Region, b) The Western Sedimentary Hills, and c) The Central Plain (Said, 1962; El-Refai, 1984; and Shendy, 1984). Soils in southern Sinai can only be found in El-Qaa Plain and some wadis, where the rest is mountainous area (NARSS, 1995). The underground water is considered the main source of water supply in El-Qaa Plain. It exists in several aquifers, namely basement rocks, Nubian sandstones and Quaternary deposits (El-Shazly et al., 1974; Dames and Moore, 1985; WRRI and JICA, 1999). Agriculture is mainly practiced in the middle sector of El-Qaa plain near El-Tur City on the Red Sea coast, where parts of the plain are recently cultivated. Among the main cultivated plants are wheat (Triticum aestivum), alfa-alfa (Medicago sativa), maize (Zea mays), date palm (Phoenix dactylifera) and various vegetables (Abd El-Ghani and Amer, 2003).

**Remote sensing materials:**

- 2 SPOT5 images (118-292, 118-292 dated 23/10/2006, with spatial resolution 10 m) (Fig. 3) were classified into several classes (clusters) using unsupervised classification technique; each class represents different mapping units (Fig. 4) using ERDAS Imagine 9.2 software.

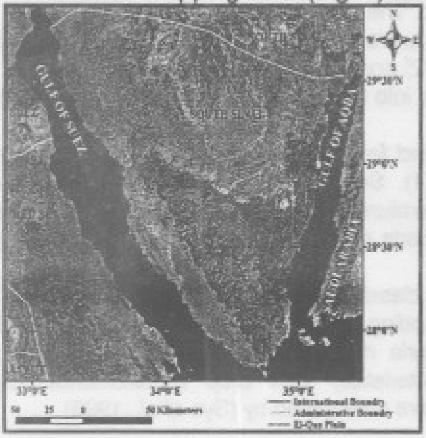

**Fig. (1): The location of the studied area.**

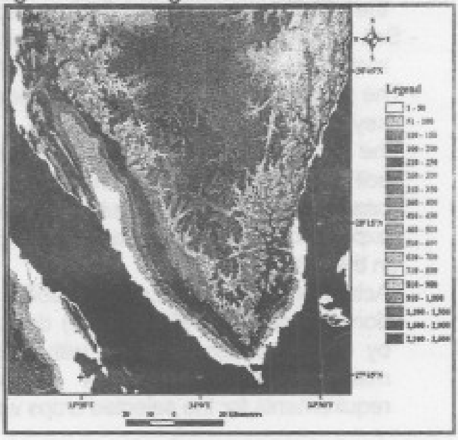

**Fig. (2): The altitude of Sinai Peninsula (DEM).**

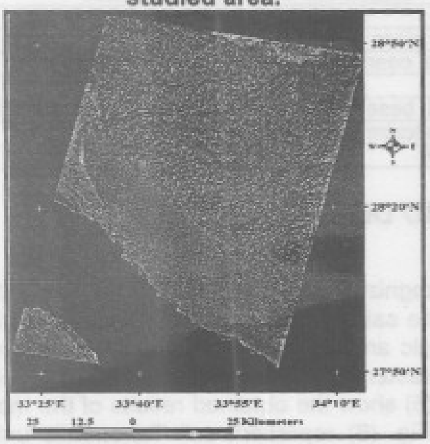

**Fig. (3): SPOT5 Mosaic of Study Area.**

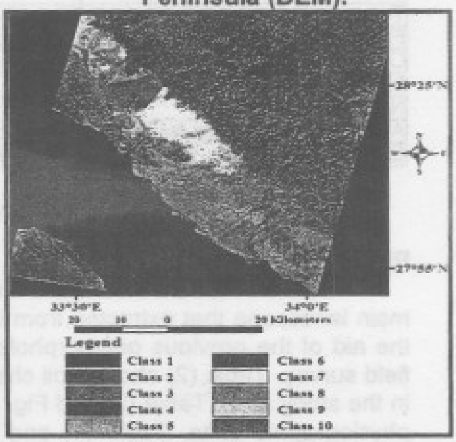


**Fig.(4):Unsupervised Classification.**

**The field works was carried out as follows:**

- The base map of the study area which was obtained from the unsupervised classification and visual interpretation (using ERDAS Imagine 9.2, and ARCGIS 9.2 software) by draping SPOT5 image over DEM to get the feel of natural 3D terrain Dobos *et al.*, 2002; Aksoy *et al.*, 2009) was used in the field to check, confirm, correct and modify the physiographic mapping unit boundaries.
- Four sample areas were chosen. These sample areas were selected so that they run across the study area passing through the different landforms.
- Detailed morphological description of 26 soil profiles selected to represent the different landforms was recorded on the basis outlined by FAO (2006).
- 75 disturbed soil samples were collected for determining different soil properties.
- According to the field works, boundaries between the different mapping units (in the initial base map) were demarcated. The physiographic units were identified.
- Soil (Physical and Chemical) analyses were carried out according to the standard method published by Page *et al.*, (1982) and Baruah and Barthakur (1997).
- The physiographic units were classified into the subgroup level on the basis of the key to soil taxonomy (USDA, 2006).
- The soil quality indicators were selected for land evaluation and their diagnostic soil characteristics listed in Table (1). Selection of these land qualities was based on a review of published literature and experimental reports, regional experience, consultation with the experts on land evaluation and data collected in the field.
- Actual and potential Land suitability classification for some specific crops was done according to FAO (1976) depending on soil rating after (Sys *et al.*, 1991) by using limitation method with criteria number and intensity of limitation by matching land qualities (or characteristics) with crop requirements. Crop requirements for the selected crops were determined by (Sys *et al.*, 1993).

**Table (1): The soil quality indicators.**

| Soil Quality | Diagnostic Soil Characteristics |
|---|---|
| Topography | Slope % |
| Flooding hazard | Flooding class |
| Oxygen availability | Drainage, coarse fragments |
| Moisture availability | Texture. |
| Nutrient availability | CEC, pH, base saturation, sum of basic cations, OC |
| Adequacy of foothold for roots | Depth, calcium carbonate content, gypsum |
| Salinity & Alkalinity | $EC_e$, ESP |

# RESULTS AND DISCUSSION

**Physiography and Soils:**

The main terrain units were recognized and delineated by analyzing the main landscape that extracted from the satellite image draped over DEM with the aid of the previous geomorphologic and topographic maps and intensive field survey. Table (2) shows soil characteristics of the different mapping units in the study area. Table (3) and Fig. (5) show the obtained results of the main physiographic units. Table (4) and Fig. (6) represent soil Taxonomic units according to USDA (2006) in the study area.

Table (2): Soil characteristics of the different mapping units.

| Mapping unit | Profile No. | depth (cm) | Coarse fragments % | Texture | pH | EC (dS/m) | ESP % | $CaCO_3$ % | Gypsum % | CEC (meq/100g soil) | O. C % | Slope % | Flooding | Drainage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Low sand sheets (LSS) | p15 | 150 | 25.1 | S | 8.2 | 10.2 | 50.7 | 6 | 0.03 | 5.4 | 0.8 | Gently slope (2.1%) | F0 | well |
| | p20 | 150 | 3.8 | LS | 7.8 | 56.7 | 89.8 | 7 | 0.48 | 8.4 | 1.7 | Nearly level (1%) | F0 | well |
| | p21 | 150 | 27.5 | S | 7.4 | 103.5 | 70.5 | 11 | 1.15 | 6.1 | 1.2 | Very gently sloping (1.7%) | F0 | well |
| | p22 | 150 | 11.0 | S | 8.0 | 23.0 | 53.3 | 10 | 0.11 | 6.1 | 1.0 | Gently slope (2.2%) | F0 | well |
| | p24 | 150 | 14.6 | S | 8.0 | 22.6 | 65.8 | 6 | 0.20 | 5.3 | 1.0 | Gently slope (2%) | F0 | well |
| | p25 | 150 | 10.5 | S | 7.6 | 71.4 | 77.8 | 15 | 0.36 | 6.5 | 2.1 | Gently slope (2.3%) | F0 | well |
| | p26 | 150 | 16.5 | S | 8.3 | 24.2 | 53.9 | 22 | 0.24 | 7.0 | 1.8 | Very gently sloping (1.8%) | F0 | well |
| Moderately sand sheets (MSS) | p8 | 150 | 10.8 | S | 8.2 | 3.7 | 26.3 | 9 | 0.04 | 5.1 | 1.2 | Gently slope (4.4%) | F0 | well |
| | p10 | 150 | 18.3 | S | 8.3 | 3.7 | 29.3 | 9 | 0.20 | 5.7 | 0.6 | Gently slope (3.7%) | F0 | well |
| | p29 | 150 | 18.6 | S | 7.7 | 16.1 | 74.0 | 10 | 0.04 | 5.1 | 0.7 | Gently slope (3%) | F0 | well |
| High sand sheets (HSS) | p30 | 150 | 12.9 | S | 8.3 | 8.8 | 32.6 | 6 | 0.06 | 5.0 | 0.6 | Sloping (8.5%) | F0 | well |
| | p31 | 150 | 20.0 | S | 8.1 | 4.4 | 24.2 | 6 | 0.42 | 7.7 | 1.4 | Sloping (9.5%) | F0 | well |
| | p33 | 150 | 20.8 | S | 8.2 | 6.3 | 46.0 | 8 | 0.04 | 5.5 | 1.0 | Sloping (6.1%) | F0 | well |
| | p34 | 150 | 19.6 | S | 8.0 | 15.4 | 35.8 | 13 | 0.45 | 5.3 | 1.0 | Sloping (5.1%) | F0 | well |
| Bajada (BJ) | p2 | 150 | 8.0 | LS | 8.0 | 14.7 | 32.5 | 21 | 0.45 | 9.9 | 1.3 | Gently slope (3.7%) | F0 | well |
| | p3 | 150 | 8.6 | LS | 7.9 | 41.4 | 69.5 | 18 | 0.53 | 12.3 | 1.2 | Gently slope (2.1%) | F0 | well |
| | p4 | 150 | 10.6 | S | 8.1 | 36.3 | 55.5 | 12 | 0.52 | 6.9 | 2.7 | Gently slope (2.8%) | F0 | well |
| | p5 | 150 | 18.4 | S | 8.4 | 3.1 | 31.9 | 8 | 0.05 | 5.3 | 1.4 | Gently slope (2.4%) | F0 | well |
| | p6 | 150 | 9.3 | LS | 8.5 | 17.7 | 80.6 | 7 | 0.34 | 12.1 | 0.7 | Gently slope (3.7%) | F0 | well |
| | p7 | 150 | 12.7 | S | 8.5 | 1.8 | 23.3 | 7 | 0.04 | 4.4 | 0.7 | Gently slope (4%) | F0 | well |
| Wadis (W) | p1 | 150 | 0.0 | SL | 7.4 | 32.0 | 41.4 | 36 | 0.37 | 15.7 | 1.8 | Gently slope (3.7%) | F0 | well |
| | p13 | 150 | 25.1 | S | 8.2 | 5.3 | 28.9 | 10 | 0.09 | 5.3 | 0.9 | Gently slope (2.4%) | F0 | well |
| | p32 | 150 | 24.3 | S | 8.4 | 1.1 | 23.8 | 7 | 0.03 | 3.1 | 0.8 | Sloping (6.2%) | F0 | well |
| Basin (BS) | p17 | 150 | 0.0 | SCL | 8.4 | 14.0 | 49.1 | 32 | 0.43 | 23.5 | 1.1 | Gently slope (2.1%) | F0 | Mod. |
| Dry Sabkhas (DSK) | p19 | 100 | 0.0 | LS | 7.6 | 45.2 | 73.4 | 8 | 0.86 | 13.4 | 1.6 | Nearly level (1%) | F1 | Mod. |
| Wet Sabkhas (WSK) | p28 | 60 | 0.0 | S | 7.4 | 101.4 | 88.4 | 5 | 0.42 | 8.2 | 1.5 | Very gently sloping (1.4%) | F2 | Imp. |

**S: Sand**
**SL: Sandy Loam**
**LS: Loamy sand**
**SCL: Sand clay loam**

**F0: no flooding**
**F1: moderate flooding**
**F2: sever flooding**

**Mod. : Moderately drained**
**Imp.: Imperfect**

**Table (3): Physiographic legend and areas of the different mapping units.**

| Physiographic units | Landform | Mapping units | Area ($Km^2$) | Total area % |
|---|---|---|---|---|
| Sand Sheets (SS) | - Low sand sheets<br>- Moderately sand sheets<br>- High sand sheets | LSS<br>MSS<br>HSS | 252.4<br>217.9<br>430.1 | 14.48<br>12.50<br>24.68 |
| | | | 900.4 | 51.67 |
| Bajada | Bajada | BJ | 317.5 | 18.22 |
| Wadis | Wadis | W | 147.6 | 8.47 |
| Basin | Basin | BS | 9.4 | 0.54 |
| Sabkhas (SK) | - Dry Sabkhas.<br>- Wet Sabkhas. | DSK<br>WSK | 3.9<br>33.5 | 0.22<br>1.92 |
| | | | 37.4 | 2.15 |
| Alluvial Fan | Alluvial Fan | AF | 33.3 | 1.91 |
| Ridge | Ridge | RD | 106.2 | 6.09 |
| Inclined Limestone | Inclined Limestone | IL | 72.3 | 4.15 |
| Rocky Hill | Rocky Hill | RH | 88.7 | 5.09 |
| Urban Area | Urban Area | UA | 26.8 | 1.54 |
| Beach | Beach | BE | 2.8 | 0.16 |
| Marine Spit | Marine Spit | MS | 0.2 | 0.01 |
| **Total area** | | | 1742.6 $km^2$<br>(414,904.8 Feddans) | |

**Table (4): Soil taxonomy of the study area.**

| Physiographic units | Landform | Mapping units | Kind of mapping unit | Soil taxonomy | Profile No. |
|---|---|---|---|---|---|
| Sand sheets (SS) | - Low sand sheets | LSS | Ass.* | Typic Torripsamments<br>Typic Haplosalids | 15,22,24<br>20,21,25,26 |
| | - Moderately sand sheets | MSS | Con.** | Typic Torripsamments | 8,10,29 |
| | - High sand sheets | HSS | Con. | Typic Torripsamments | 30,31,33,34 |
| Bajada | Bajada | BJ | Ass. | Typic Torripsamments<br>Sodic Haplocalcids | 3,4,5,6,7<br>2 |
| Wadis | Wadis | W | Ass. | Typic Torripsamments<br>Sodic Haplocalcids | 13,32<br>1 |
| Basins | Basins | BS | Con. | Typic Torriorthents | 17 |
| Sabkhas (SK) | - Dry Sabkhas | KF1 | Con. | Typic Aquisalids | 19 |
| | - Wet Sabkhas | KF2 | Con. | Sodic Psammaquents | 28 |
| Alluvial fan | Alluvial fan | AF | | | |
| Ridge | Ridge | RD | | | |
| Inclined limestone | Inclined limestone | IL | | | |
| Rocky hill | Rocky hill | RH | | | |
| Urban area | Urban area | UA | | | |
| Beach | Beach | BE | | | |
| Marine spit | Marine spit | MS | | | |

* **Association** ** **Consociation**

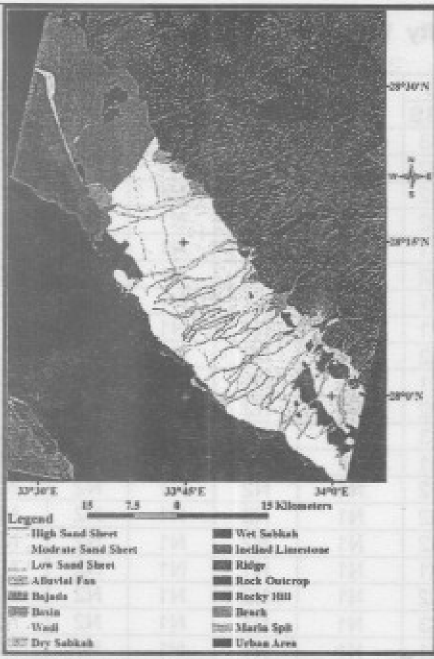


Fig. (5): Physiographic map of the study area.

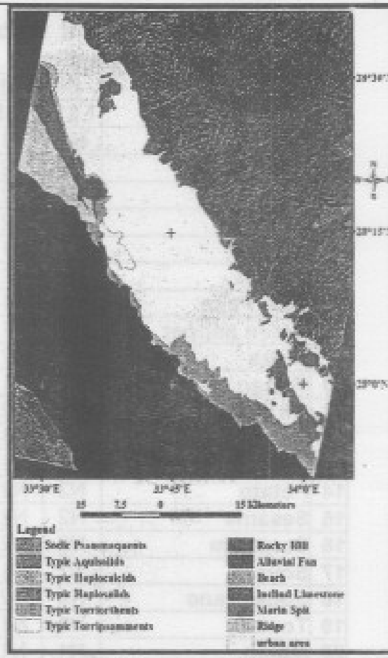


Fig. (6): Soil map of the study area.

**Land Suitability for Crops:**

Actual and potential suitability calculated according to FAO (1976) depending on soil rating after (Sys *et al.*, 1991) deals with land qualities (or characteristics) coupled with crops requirements for the selected crops which determined by (Sys *et al.*, 1993).

Current land suitability for crops in the different mapping units is shown in Table (5). The potential soil suitability for crops depends upon the limiting factors and the possibility of soil improvement in the different mapping units is shown in Table (6) and Fig. (7).

**Table (5): Current land suitability for selected crops in the different mapping units.**

| | | Sand sheets | | | Bajada | Wadi | Basin | Sabkhas | |
|---|---|---|---|---|---|---|---|---|---|
| | | LSS | MSS | HSS | | | | Dry | Wet |
| 1 | Alfalfa | N1 | S3 | S3 | N1 | N1 | N1 | N2 | N2 |
| 2 | Banana | N2 | N2 | N2 | N1 | N2 | N1 | N2 | N2 |
| 3 | Barley | N2 | N2 | N2 | N2 | N2 | N1 | N2 | N2 |
| 4 | Beans | N2 | N2 | N2 | N1 | N2 | N1 | N2 | N2 |
| 5 | Citrus | N1 | N1 | N1 | N1 | N1 | N1 | N2 | N2 |
| 6 | Cotton | N2 | N2 | N2 | N1 | N2 | N1 | N2 | N2 |
| 7 | Date Palm | N1 | N1 | N1 | N1 | N1 | N1 | N2 | N2 |
| 8 | Green pepper | N1 | N1 | N1 | N1 | N1 | N1 | N2 | N2 |
| 9 | Maize | N2 | N2 | N2 | N1 | N2 | N1 | N2 | N2 |
| 10 | Mango | N1 | N1 | N1 | N1 | N1 | N1 | N2 | N2 |
| 11 | Oil palm | N2 | N2 | N2 | N2 | N2 | N1 | N2 | N2 |
| 12 | Olives | N1 | S3 | S3 | N1 | S3 | N1 | N2 | N2 |
| 13 | Onion | N1 | N1 | N1 | N1 | N1 | N1 | N2 | N2 |
| 14 | Potato | N2 | N2 | N2 | N1 | N2 | N1 | N2 | N2 |
| 15 | Sesame | N2 | N2 | N2 | N1 | N2 | N1 | N2 | N2 |
| 16 | Sorghum | N2 | N2 | N2 | N1 | N2 | N1 | N2 | N2 |
| 17 | Soya | N1 | N1 | N1 | N1 | N1 | N1 | N2 | N2 |
| 18 | Sugar cane | N2 | N2 | N2 | N1 | N2 | N1 | N2 | N2 |
| 19 | Tomato | N1 | N1 | S3 | N1 | N1 | N1 | N2 | N2 |
| 20 | Melon | N1 | N1 | N1 | N1 | N1 | N1 | N2 | N2 |
| 21 | Wheat | N2 | N2 | N2 | N2 | N2 | N1 | N2 | N2 |

**Table (6): Potential land suitability for selected crops in the different mapping units.**

| | | Sand sheets | | | Bajada | Wadi | Basin | Sabkhas | |
|---|---|---|---|---|---|---|---|---|---|
| | | LSS | MSS | HSS | | | | Dry | Wet |
| 1 | Alfalfa | S3 | S3 | S3 | S2 | S3 | S2 | N2 | N2 |
| 2 | Banana | N2 | N2 | N2 | S3 | N2 | S3 | N2 | N2 |
| 3 | Barley | N2 | N2 | N2 | N2 | N2 | S2 | N2 | N2 |
| 4 | Beans | N2 | N2 | N2 | S3 | N2 | S3 | N2 | N2 |
| 5 | Citrus | S2 | S2 | S2 | S2 | S2 | S3 | N2 | N2 |
| 6 | Cotton | N2 | N2 | N2 | S3 | N2 | S2 | N2 | N2 |
| 7 | Date Palm | S2 | S2 | S2 | S2 | S2 | S3 | N2 | N2 |
| 8 | Green pepper | S2 | S2 | S2 | S2 | S2 | S3 | N2 | N2 |
| 9 | Maize | N2 | N2 | N2 | S3 | N2 | S2 | N2 | N2 |
| 10 | Mango | S3 | S3 | S3 | S2 | S3 | S3 | N2 | N2 |
| 11 | Oil palm | N2 | N2 | N2 | N2 | N2 | S3 | N2 | N2 |
| 12 | Olives | S3 | S3 | S3 | S2 | S3 | S1 | N2 | N2 |
| 13 | Onion | S3 | S3 | S3 | S2 | S3 | S3 | N2 | N2 |
| 14 | Potato | N2 | N2 | N2 | S3 | N2 | S3 | N2 | N2 |
| 15 | Sesame | N2 | N2 | N2 | S2 | N2 | S3 | N2 | N2 |
| 16 | Sorghum | N2 | N2 | N2 | S3 | N2 | S2 | N2 | N2 |
| 17 | Soya | S3 | S3 | S3 | S3 | S3 | S3 | N2 | N2 |
| 18 | Sugar cane | N2 | N2 | N2 | S3 | N2 | S2 | N2 | N2 |
| 19 | Tomato | S3 | S3 | S3 | S3 | S3 | S3 | N2 | N2 |
| 20 | Melon | S2 | S2 | S2 | S2 | S2 | S3 | N2 | N2 |
| 21 | Wheat | N2 | N2 | N2 | N2 | N2 | S2 | N2 | N2 |

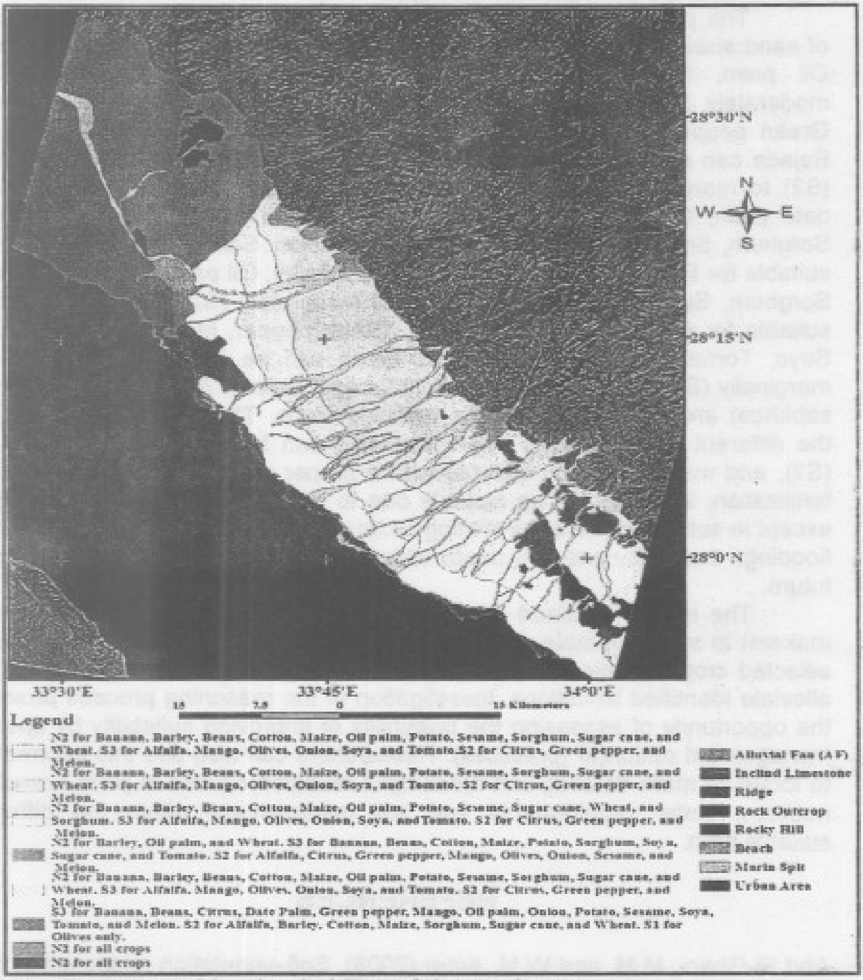


Fig. (7): Potential land suitability of the study area.

## Conclusion

Soils in the study area include: sand sheet (Low, moderate, and high) (252.4, 217.9, and 430.1 $km^2$) classified as Typic Torripsamments and Typic Haplosalids. Bajada (317.5 $km^2$) classified as Typic Torripsamments and Sodic Haplocalcids. Wadis (147.6 $km^2$) classified as Typic Torripsamments and Sodic Haplocalcids. Basin (9.4 $km^2$) classified as Typic Torriorthents. Dry Sabkhas (3.9 $km^2$) classified as Typic Aquisalids, and Wet Sabkhas (33.5 $km^2$) classified as Sodic Psammaquents.

The suitability of the selected crops currently not suitable in the different mapping units. The main limiting factors are texture, salinity and alkalinity, nutrient availability and calcium carbonate content, only in sabkhas added flooding, drainage, and soil depth.

The potential suitability in the different mapping units refers that soils of sand sheet can not be suitable for Banana, Barley, Beans, Cotton, Maize, Oil palm, Potato, Sesame, Sorghum, Sugar cane, and Wheat, and moderately (S2) to marginally (S3) suitable for Alfalfa, Citrus, date palm, Green pepper, Mango, Olives, Onion, Soya, Tomato, and Melon. Soils of Bajada can not be suitable for Barley, Oil palm, and Wheat, and moderately (S2) to marginally (S3) suitable for Alfalfa, Banana, Beans, Citrus, Cotton, date palm, Green pepper, Maize, Mango, Olives, Onion, Potato, Sesame, Sorghum, Soya, Sugar cane, Tomato, and Melon. Soils of Wadis can not be suitable for Banana, Barley, Beans, Cotton, Maize, Oil palm, Potato, Sesame, Sorghum, Sugar cane, and Wheat, and moderately (S2) to marginally (S3) suitable for Alfalfa, Citrus, Date Palm, Green pepper, Mango, Olives, Onion, Soya, Tomato, and Melon. Soils of basin can be highly suitable (S1) to marginally (S3) suitable for the selected crops. Soils of Alkali flat (dry and wet sabkhas) are not suitable for the selected crops. The potential suitability in the different mapping units refers that soils can be highly (S1), moderately (S2), and marginally (S3) suitable with a proper management practices and fertilization, and can not be suitable due to soil texture in all mapping units except in sabkhas where the limiting factors are texture, salinity and alkalinity, flooding, drainage, and soil depth which can not be enhanced in the near future.

The results obtained can be employed by landuse planners (decision makers) to select suitable areas for the selected crops production. Outputs of selected crops enable the user to select management options (practices) to alleviate identified limitations. Investigation of the reasoning process provides the opportunity of assessing the possibility of improving suitability by specific management option(s) (practices). Researchers can also use this information to focus on more detailed and meaningful research options in plant breeding, nutrition, water requirements and soil management within the different suitable area.

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## تقييم صلاحية التربة لبعض المحاصيل بإستخدام الاستشعار من بعد و نظم المعلومات الجغرافية بسهل القاع، جنوب سيناء، مصر.

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زيادة النمو السكانى والازمة الغذائية كان حافزا لزيادة الانتاج وزيادة المساحة المزروعة افقيا واستخدام الاراضى بناءا على قدراتها طريقة مناسبة. لذلك تهدف هذه الدراسة الى التكامل بين جودة التربة (أوخصائص التربة) وبيانات الاستشعار من بعد ونموذج الارتفاعات الرقمية (ثلاثى الابعاد) من خلال نظم المعلومات الجغرافية للإنتاج قاعدة بيانات للموارد الارضية، تم استخدام صور القمر الصناعى الفرنسى SPOT5 للانتاج خريطة الاساس، وبناءآ على الاعمال الحقلية والتحليلات المعملية لعينات التربة المختلفة المأخوذة تم التحقق والتأكد وتصحيح وتعديل الحدود بين الوحدات المورفولوجية المختلفة. تم تقسيم الاراضى بمنطقة الدراسة بناءا على التقسيم الامريكى. تم تقييم صلاحية التربة (الحالية والكامنة) لعدد ٢١ محصول مختلف بإستخدام نظام منظمة الاغذية والزراعة FAO,1976 على اساس معدلات Sys., *et. al.*, 1991 ومقارنتها بالاحتياجات المحصولية المقدرة بواسطة Sys., *et. al.*,1993. صلاحية التربة للمحاصيل المختلفة الحالية تشير الى ان التربة غير صالحة فى جميع الوحدات الخرائطية، العوامل المحددة الرئيسية هى القوام، الملوحة، القلوية، توافر العناصر الغذائية، ومحتوى كربونات الكالسيوم، فقط فى السبخات يضاف اليهم الغمر، الصرف، وعمق التربة. صلاحية التربة للمحاصيل المختلفة الكامنة تشير الى ان التربة يمكن ان تكون عالية ومتوسطة ومحدودة الصلاحية فى ظل عمليات ادارة وتسميد مناسبة، ويمكن ان تكون غير صالحة بسبب قوام التربة كعامل محدد فى جميع الوحدات الخرائطية المختلفة، فيما عدا السبخات حيث ان العوامل المحددة هى القوام، الملوحة، القلوية، الغمر، الصرف، وعمق التربة. النتائج المتحصل عليها يمكن ان توظف بواسطة المخططى للاستخدام الاراضى (متخذى القرار) لتحديد المناطق الصالحة للانتاج المحاصيل المختلفة بمنطقة الدراسة.

قام بتحكيم البحث

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