# Land Evaluation of Old Irrigated Soils in North Delta Region (Rewena Canal Area) at Kafr El Sheikh Governorate

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## ABSTRACT

**Quantified land evaluation of soils at Kafr El-sheikh governorate in north delta was carried out. These soils represent the area of Rewena canal and located between Kafr El-Sheikh and Sidi Salem district. Land capability and suitability for different crops was made through defining and determining soil physical, chemical properties and environmental properties as well as nutrients status. The quality of irrigation water was also determined as well as climatic data.**

**ASLE program (Applied System of Land Evaluation) was used for calculating land capability and there suitability for different vegetable, crops and fruits with a total of 28 plants.**

**Results indicate that the studied area was classified into two land capability classes: class 2 (good) and class 3 (faire).**

**Limitation factors for land capability were the relatively low soil permeability, shallow ground water table in some parts, the relative increment of soil salinity in others, as well as ground water salinity and low levels of soil organic matter and nutrients especially NPK.**

**Concerning land suitability, different crops can be grown in these soils except pepper, Olive, Fig and Peanut, while the suitable crops could be arranged by preference as: Barely > Wheat > Sugar beet > Sunflower > Cotton > Rice.**

## INTRODUCTION

Agricultural production plays an important role in the Egyptian economy. It is considered as the source of national income and the way of life for a sizable part of the population. The agricultural sector in Egypt absorbs 38.2 % of the labor force and able to absorb more. Egyptian Agricultural lands occupy about 4 % (about 8.3 million Feddans) of Egypt area (FAO, 2001). Egypt is now facing a major challenge of how to increase the rate of growth in agriculture production to generate and meet its future food requirements to cope a very high annual rate of population increasing (2.3%). The national strategy of Egypt aims to adding about 4.32 million Feddens of new land reclamation until year 2017 in different region, based on land suitability and water resources availability (GARPAD) 1997.

Land evaluation is a term used to describe the process of collating and interpreting basic inventories of soil, vegetation cover, environmental condition, climatic status and many other aspects of land in order to identify and compare land use alternative.

Riquier et al (1970) proposed the parametric method of land evaluation and claimed that limitations, as negative and complex concepts in both present and future capability, are better expressed in terms of productivity.

Sys and Verheye (1972) suggested the calculation of a productivity index as an indication of land capability according to multiplication method. Five main groups of parameters were included namely, soil physical, and soil chemical, topographic, soil fertility and irrigation water parameters.

According to FAO (1976), land evaluation is the prediction of land performance overtime under specific uses. Sys (1979) stated that land evaluation is an opinion, an assessment, a careful judgment. The land evaluation objective is guide wisely the present management and plan the future and best land use among alternatives.

Abd El-Motteleb and Hussein (1985) (Arabic) considered that soil characteristics and environmental conditions are the main factor of land productivity and land classification. In this system, six soil classes were introduced, based on both soil properties and environmental conditions.

Marie et al (1987) proposed a computer program for land evaluation system (LE) based on that of Abd El-Motteleb and Hussien (1985). This system was modified by EL-Fayoumy (1989) to include soil fertility and irrigation water factor. The last form of this system was developed as a new edition (ASLE) (Morsy, 1994) by adding land suitability to different crops based on land properties as well as climatic data. Each factor was described as an index value to give its statues in the percentage form.

Ismail et al (2001), by using (ASLE), sited that Samoul area (was part of Nile Delta Region) could be classified into two good and moderate capability classes. Where Burg El Arab and El-Shahama (in the western desert) area was Moderate and Marginal capability classes. He also added that the main limitations were low and high soil permeability, low percentage of clay, shallow water table, soil salinity, soil structure, low soil organic matter and nutrients.

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Naser Eldin (2001) in his study on Kafr El–Sheikh Governorate soil found that, land capability classes were Excellent, good, faire and poor and the main limitations were shallow water table, drainage system and nutrients.

Fayed (2003) evaluated the land capability of El–Bostan region West Nile Delta. He found that, the studied area classified into two land capability (Moderate and Marginal). He also added that, the main limiting soil factors in the studied soils were soil texture, ESP, salinity and calcium carbonate content.

Higab (2005) evaluate some soils of south El–Borolus Lake area. He found that the capability index for these soils area ($S_2$) good soil, ($S_3$) fair soil and ($N_1$) non–agriculture soils.

## MATERIAL AND METHODS

The area is located at North Delta (Fig.1), the elevation was varied between 2m and 6m a.s.l., at Kafr El-Sheikh Governorate, beside Rewena Canal. It is bounded by Sidi Salem sector (El-Masharqa village) from the North to Rewena village from the South and Nashart Drainage from the West to drainage no. 7 from the East (Fig. 2).

These areas were irrigated by Fresh water from Rewena canal and served by tile drainage system. The location of the studied area is shown in map (Fig.2).

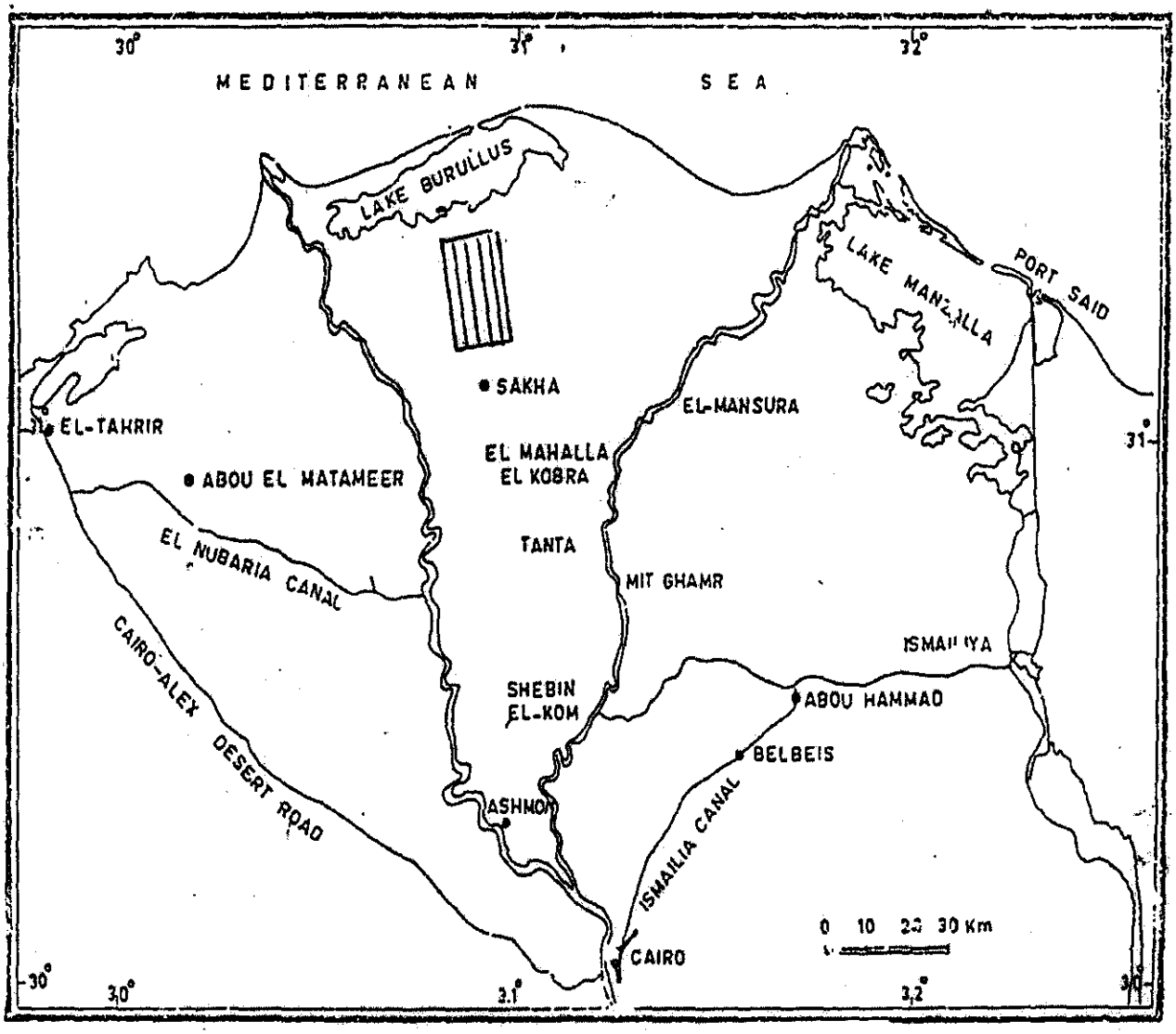



**Fig.1. Location of the studied area**

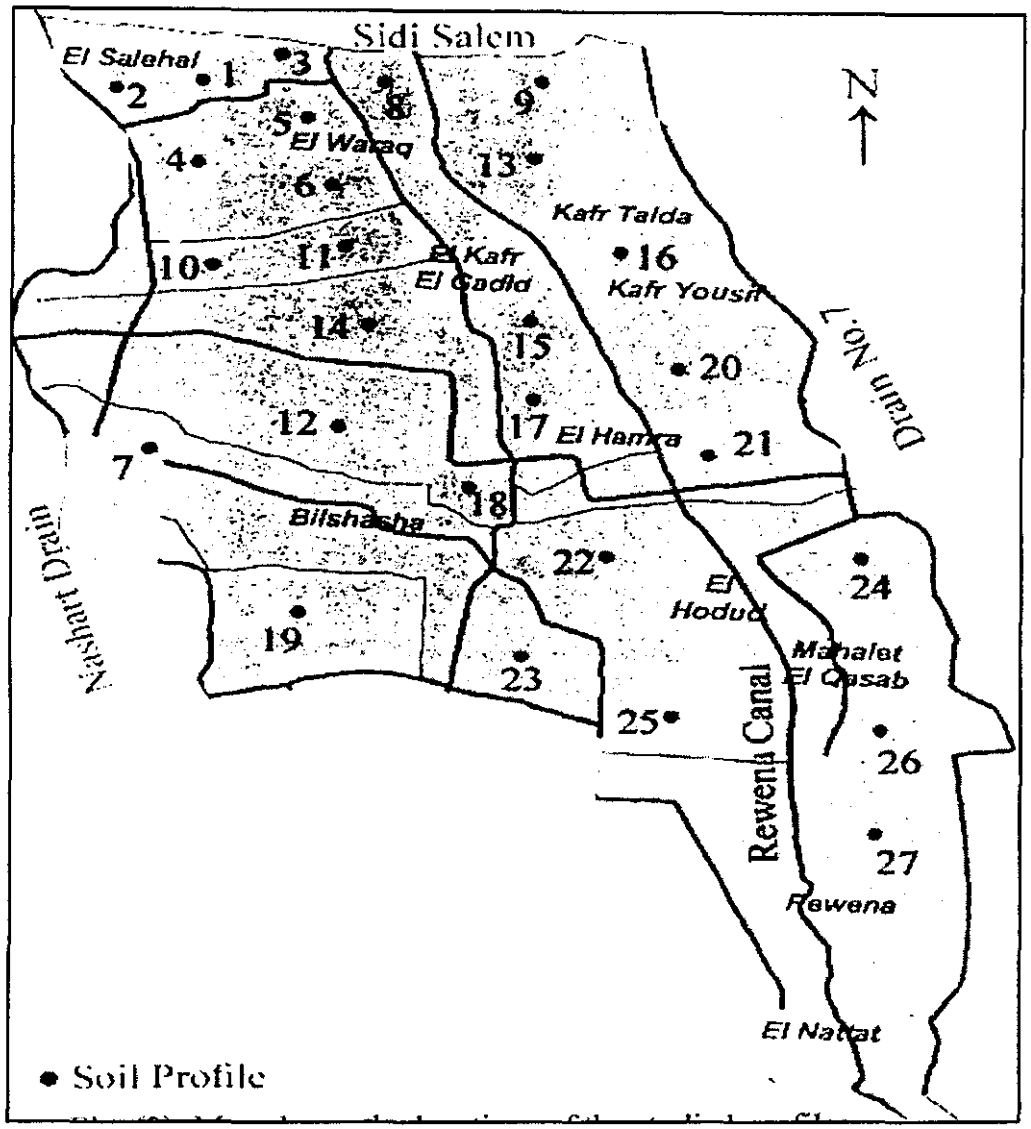



**Fig. 2. Map shows the locations of the studied profiles**

**Field work and laboratory analysis:**

Twenty seven soil profiles were selected as old lands from Rewena command area at kafr El-Sheikh governorate and sited using GPS. Soil samples were collected from different layers according to morphological variations or equal distances for homogeneous profiles and were subjected to different physical and chemical analysis as irrigation and ground water samples.

**Samples analysis:**

EC (dS/m), PH, OM% and CaCO3% according to Jackson, (1973).

ESP was calculated according to the formula:

$$ESP = \frac{100(-0.0126+0.01475\ SAR)}{1+(-0.0126+0.01475\ SAR)}$$ , (Richard, 1954).

CEC according to Klute (1986).

Available N and K, according to Cottenie et al (1982).

Available P, according to Olsen et al (1954).

Mechanical analysis, according to Piper (1950).

Hydraulic conductivity (as Ks) by auger hole method according to Van Beers (1970).

Structure Factor was calculated according to the following formula:

$$SF = \{1 - \frac{\text{\% clay in aggregation analysis}}{\text{\% clay in mechanical analysis}}\} \times 100$$

Available water (A.W.) calculated according to the formula:

Available water = filed capacity – wilting point, according to Kulte (1986).

## Land evaluation

Land evaluation and quantified recommendations for soil improvement were implemented using "applied system for land evaluation (ASLE) ". This system calculates the land evaluation as a percentage value based on four main factors; soil properties, irrigation water quality, soil fertility and environmental conditions as well as climatic data. The final index of land evaluation (F.I.L.E) was calculated as:

$$F.I.L.E = \frac{4}{\frac{1}{S.I} + \frac{1}{W.I} + \frac{1}{F.I} + \frac{1}{E.I}}$$ Ismail et al (1994)

Where: S.I: the soil index.

W.I: the irrigation water index.

F.I: the soil fertility index.

E.I: the environmental index.

## RESULTS AND DISCUSSION

### Soil characteristics:

### Soil physical properties:

Data in Tables (1) revealed that, clay content ranged between 21.80 % to 63.10%. The soil depth is moderate and ranged from 60 cm to 120 cm. The soil structure factor ranged from 18.60% to 44.60%, while the hydraulic conductivity is low and ranged from 0.13 cm / h to 4.83 cm / h. These low values may be attributed to the decrease of organic matter content and higher ESP and SAR values (Madkour et al, 1999). The available water varied from 13.62 %to 22.34% and it depends on clay and organic matter.

**Table 1. Physical properties of the studied soil of studied profiles**

| P. no. | Depth cm | Clay % | S.F % | AW % | $K_s$ cm/h | Profile depth cm | Slop % |
|---|---|---|---|---|---|---|---|
| | 0-25 | 57.5 | 33.8 | 20.06 | | | |
| 1 | 25-65 | 60.1 | 40.6 | 9.58 | 1.49 | 90 | 1.50 |
| | 65-100 | 58.2 | 39.5 | | | | |
| | 0-20 | 56.2 | 32.8 | 18.14 | | | |
| 2 | 20-60 | 57.2 | 32.6 | 16.18 | 4.83 | 120 | 1.50 |
| | 60-100 | 55.3 | 31.7 | | | | |
| | 0-25 | 46.2 | 30.8 | 19.43 | | | |
| 3 | 25-70 | 48.8 | 31.2 | 16.73 | 0.73 | 100 | 1.50 |
| | 70-100 | 44.2 | 33.6 | | | | |
| | 0-20 | 51.7 | 34.5 | 18.45 | | | |
| 4 | 20-50 | 55.9 | 36.8 | 17.6 | 0.58 | 90 | 1.50 |
| | 50-100 | 52.5 | 31.8 | | | | |
| | 0-25 | 55.1 | 35.8 | 18.05 | | | |
| 5 | 25-65 | 57.6 | 35.2 | 18.41 | 3.67 | 90 | 1.50 |
| | 65-100 | 36.2 | 22.4 | | | | |
| | 0-25 | 51.5 | 35.8 | 18.35 | | | |
| 6 | 25-70 | 49.5 | 31.4 | 18.15 | 3.84 | 100 | 1.60 |
| | 70-100 | 45.1 | 32.2 | | | | |
| | 0-20 | 55.3 | 35.1 | 20.41 | | | |
| 7 | 20-60 | 59.4 | 37.6 | 18.35 | 1.23 | 90 | 1.60 |
| | 60-100 | 56.5 | 36.2 | | | | |
| | 0-20 | 48.6 | 32.4 | 19.94 | | | |
| 8 | 20-55 | 54 | 35.2 | 17.56 | 1.25 | 100 | 1.60 |
| | 55-100 | 53.7 | 34.2 | | | | |
| | 0-25 | 56 | 34.2 | 22.33 | | | |
| 9 | 25-65 | 52.6 | 31.9 | 17.86 | 1.24 | 90 | 1.60 |
| | 65-100 | 25.5 | 18.6 | | | | |
| | 0-20 | 60.60 | 44.60 | 22.26 | | | |
| 10 | 20-60 | 58.70 | 33.80 | 18.08 | 1.21 | 90 | 1.30 |
| | 60-100 | 60.50 | 40.20 | | | | |
| | 0-20 | 52.60 | 38.60 | 13.62 | | | |
| 11 | 20-55 | 56.20 | 39.00 | 17.50 | 0.43 | 80 | 1.30 |
| | 55-100 | 54.30 | 35.60 | | | | |

**Table 1. Cont**

| P. no. | Depth cm | Clay % | S.F % | AW % | $K_s$ cm/h | Profile depth cm | Slope % |
|---|---|---|---|---|---|---|---|
| | 0-20 | 57.30 | 36.80 | 20.96 | | | |
| 12 | 20-55 | 63.10 | 42.20 | 21.43 | 0.13 | 90 | 1.50 |
| | 55-100 | 59.20 | 40.80 | | | | |
| | 0-30 | 59.20 | 40.10 | 17.66 | | | |
| 13 | 30-60 | 56.60 | 36.20 | 15.73 | 0.49 | 60 | 1.50 |
| | 60-100 | 21.80 | 18.40 | | | | |
| | 0-20 | 46.70 | 30.20 | 22.34 | | | |
| 14 | 20-60 | 48.30 | 32.60 | 21.12 | 1.30 | 100 | 1.60 |
| | 60-90 | 48.50 | 33.10 | | | | |
| | 0-20 | 59.10 | 37.10 | 18.40 | | | |
| 15 | 20-50 | 54.00 | 36.40 | 21.99 | 1.68 | 100 | 1.60 |
| | 50-90 | 22.60 | 16.80 | | | | |
| | 0-30 | 44.70 | 33.40 | 18.32 | | | |
| 16 | 30-60 | 28.60 | 18.20 | 17.19 | 5.87 | 90 | 1.50 |
| | 60-100 | 20.50 | 16.80 | | | | |
| | 0-20 | 59.30 | 39.20 | 21.27 | | | |
| 17 | 20-60 | 62.90 | 42.80 | 17.50 | 1.52 | 100 | 1.60 |
| | 60-100 | 60.60 | 40.40 | | | | |
| | 0-35 | 49.10 | 33.30 | 17.42 | | | |
| 18 | 35-75 | 57.40 | 36.70 | 17.64 | 3.57 | 100 | 1.60 |
| | 75-100 | 54.70 | 36.80 | | | | |
| | 0-20 | 57.30 | 38.00 | 21.03 | | | |
| 19 | 20-50 | 57.80 | 38.20 | 21.11 | 0.69 | 100 | 1.60 |
| | 50-100 | 56.90 | 36.40 | | | | |
| | 0-20 | 53.30 | 33.10 | 13.72 | | | |
| 20 | 20-60 | 41.60 | 39.20 | 15.35 | 5.60 | 90 | 1.50 |
| | 60-90 | 47.20 | 40.20 | | | | |
| | 0-20 | 57.80 | 41.80 | 20.35 | | | |
| 21 | 20-50 | 54.00 | 38.20 | 21.34 | 0.59 | 80 | 1.60 |
| | 50-80 | 55.90 | 36.90 | | | | |
| | 0-20 | 56.90 | 36.20 | 20.30 | | | |
| 22 | 20-55 | 60.40 | 44.60 | 19.86 | 2.00 | 100 | 1.50 |
| | 55-100 | 59.20 | 41.20 | | | | |
| | 0-15 | 57.30 | 32.80 | 18.43 | | | |
| 23 | 15-45 | 62.10 | 40.70 | 19.34 | 0.35 | 100 | 1.50 |
| | 45-100 | 55.20 | 36.20 | | | | |
| | 0-15 | 51.40 | 29.90 | 17.84 | | | |
| 24 | 15-40 | 52.80 | 31.20 | 18.10 | 3.19 | 80 | 1.60 |
| | 40-80 | 52.50 | 31.60 | | | | |
| | 0-20 | 59.20 | 40.50 | 17.21 | | | |
| 25 | 20-50 | 56.60 | 32.60 | 17.99 | 2.32 | 80 | 1.60 |
| | 50-80 | 21.80 | 21.20 | | | | |
| | 0-15 | 44.80 | 36.10 | 16.51 | | | |
| 26 | 15-50 | 48.20 | 32.60 | 18.45 | 1.92 | 100 | 1.60 |
| | 50-100 | 46.90 | 30.20 | | | | |
| | 0-15 | 52.80 | 32.90 | 15.95 | | | |
| 27 | 15-60 | 54.60 | 30.20 | 15.56 | 2.71 | 100 | 1.60 |
| | 60-100 | 23.70 | 18.90 | | | | |

AW: Available Water S.F.: Structure Factor

**Soil chemical properties:**

Data in Tables (2) showed that, EC values varied from 0.96 to 11.9 dS/m. The CEC values ranged from 33.09 to 88.86 meq./100 g soil. While ESP values ranged from 3.85 to 20.1%; calcium carbonate content varied from 1.3% to 3.70%.

**Table 2. Chemical properties of the studied soil**

| P. no. | Depth (cm) | pH | ECe ds/m | GWS ppm | CEC meg/100 | ESP% | $CaCO_3$% |
|---|---|---|---|---|---|---|---|
| | 0-25 | 8.20 | 8.13 | | 66.86 | 13.05 | 1.90 |
| 1 | 25-65 | 8.30 | 2.72 | 7280 | 65.56 | 15.15 | 1.70 |
| | 65-100 | 8.35 | 4.52 | | 62.46 | 20.1 | 1.70 |
| | 0-20 | 8.10 | 4.28 | | 66.7 | 14.75 | 1.60 |
| 2 | 20-60 | 7.71 | 4.18 | 6412 | 73.88 | 10.25 | 1.40 |
| | 60-100 | 7.90 | 1.48 | | 53.84 | 13.6 | 1.30 |
| | 0-25 | 8.00 | 2.38 | | 43.12 | 11.6 | 2.70 |
| 3 | 25-70 | 8.40 | 3.18 | 7680 | 52.12 | 18.5 | 2.90 |
| | 70-100 | 8.50 | 11.1 | | 42.9 | 19.11 | 2.80 |
| | 0-20 | 7.50 | 3.85 | | 62.33 | 10.43 | 1.50 |
| 4 | 20-50 | 8.10 | 5.99 | 8000 | 44.9 | 16.3 | 1.50 |
| | 50-100 | 7.40 | 11.9 | | 46.16 | 9.84 | 1.30 |
| | 0-25 | 8.60 | 4.84 | | 48.3 | 16.4 | 1.50 |
| 5 | 25-65 | 8.10 | 1.26 | 2560 | 49.24 | 7.35 | 1.40 |
| | 65-100 | 8.00 | 1.53 | | 44.44 | 5.73 | 1.40 |
| | 0-25 | 7.10 | 3.68 | | 66.66 | 8.1 | 1.80 |
| 6 | 25-70 | 7.30 | 2.41 | 3200 | 69.3 | 12.24 | 1.50 |
| | 70-100 | 7.30 | 2.33 | | 52.52 | 12.38 | 1.50 |
| | 0-20 | 7.10 | 9.8 | | 71.9 | 9.04 | 1.70 |
| 7 | 20-60 | 7.20 | 9.6 | 8320 | 69.68 | 11.94 | 1.70 |
| | 60-100 | 8.10 | 9.88 | | 66.78 | 15.99 | 1.50 |
| | 0-20 | 7.70 | 1.91 | | 42.24 | 7.1 | 1.50 |
| 8 | 20-55 | 7.70 | 1.91 | 3200 | 59.51 | 6.91 | 1.50 |
| | 55-100 | 8.10 | 3.13 | | 55.76 | 17.93 | 1.40 |
| | 0-25 | 8.00 | 8.16 | | 64.1 | 13.96 | 1.90 |
| 9 | 25-65 | 7.90 | 3.87 | 5760 | 63.13 | 11.15 | 1.70 |
| | 65-100 | 7.90 | 7.07 | | 33.4 | 15.9 | 1.50 |
| | 0-20 | 8.30 | 9.91 | | 70.71 | 16.30 | 1.90 |
| 10 | 20-60 | 7.90 | 2.01 | 2650 | 30.31 | 8.73 | 1.70 |
| | 60-100 | 8.40 | 2.65 | | 79.55 | 16.81 | 1.50 |
| | 0-20 | 7.91 | 2.84 | | 52.06 | 8.29 | 1.60 |
| 11 | 20-55 | 7.60 | 4.50 | 4480 | 53.86 | 14.07 | 1.40 |
| | 55-100 | 8.10 | 5.14 | | 55.09 | 13.50 | 1.40 |
| | 0-20 | 7.60 | 5.36 | | 79.80 | 12.47 | 1.70 |
| 12 | 20-55 | 7.60 | 4.01 | 6400 | 78.44 | 13.51 | 1.50 |
| | 55-100 | 8.20 | 7.51 | | 69.22 | 17.05 | 1.50 |
| | 0-30 | 7.20 | 5.66 | | 67.34 | 8.43 | 2.10 |
| 13 | 30-60 | 7.20 | 1.86 | 5120 | 46.92 | 6.64 | 2.30 |
| | 60-100 | 8.40 | 3.95 | | 53.06 | 14.78 | 1.90 |
| | 0-20 | 7.01 | 1.44 | | 64.43 | 6.09 | 1.70 |
| 14 | 20-60 | 7.01 | 1.05 | 3520 | 67.25 | 5.32 | 1.50 |
| | 60-90 | 8.40 | 2.56 | | 67.51 | 12.10 | 1.50 |

**Table 2. Cont**

| P. no. | Depth (cm) | pH | ECe ds/m | GWS ppm | CEC meg/100 | ESP% | $CaCO_3$% |
|---|---|---|---|---|---|---|---|
| | 0-20 | 7.20 | 3.35 | | 75.01 | 6.10 | 1.70 |
| 15 | 0-50 | 7.20 | 1.41 | 5120 | 75.02 | 5.40 | 1.70 |
| | 50-90 | 7.40 | 1.60 | | 34.10 | 7.20 | 1.50 |
| | 0-30 | 7.60 | 3.21 | | 59.66 | 10.00 | 1.70 |
| 16 | 30-60 | 7.90 | 4.56 | 5760 | 38.97 | 13.20 | 1.30 |
| | 60-100 | 7.90 | 5.32 | | 27.11 | 14.81 | 1.30 |
| | 0-20 | 8.10 | 4.32 | | 76.49 | 13.70 | 1.80 |
| 17 | 20-60 | 8.60 | 1.38 | 3840 | 88.86 | 10.20 | 1.90 |
| | 60-100 | 8.90 | 4.44 | | 72.75 | 17.30 | 1.50 |
| | 0-35 | 7.40 | 1.88 | | 57.54 | 8.75 | 2.60 |
| 18 | 35-75 | 7.01 | 1.56 | 1920 | 52.84 | 3.85 | 2.80 |
| | 75-100 | 7.40 | 1.32 | | 50.48 | 11.05 | 2.80 |
| | 0-20 | 8.40 | 5.67 | | 64.80 | 11.94 | 3.70 |
| 19 | 20-50 | 8.90 | 4.80 | 4480 | 68.86 | 13.54 | 3.50 |
| | 50-100 | 8.90 | 5.30 | | 69.29 | 13.15 | 3.10 |
| | 0-20 | 7.40 | 5.25 | | 50.68 | 7.04 | 2.30 |
| 20 | 20-60 | 8.10 | 3.10 | 2560 | 59.09 | 9.94 | 2.50 |
| | 60-90 | 8.40 | 1.41 | | 61.04 | 8.88 | 2.30 |
| | 0-20 | 8.50 | 4.56 | | 62.33 | 10.43 | 2.30 |
| 21 | 20-50 | 5.20 | 1.64 | 2560 | 65.14 | 7.84 | 2.50 |
| | 50-80 | 8.70 | 1.87 | | 67.34 | 8.94 | 2.30 |
| | 0-20 | 8.01 | 1.23 | | 56.84 | 5.28 | 2.60 |
| 22 | 20-55 | 8.11 | 0.96 | 1920 | 56.62 | 6.92 | 2.20 |
| | 55-100 | 8.36 | 1.52 | | 56.08 | 9.63 | 2.20 |
| | 0-15 | 8.40 | 3.98 | | 53.32 | 10.30 | 3.60 |
| 23 | 15-45 | 8.11 | 6.71 | 5760 | 56.44 | 14.39 | 3.70 |
| | 45-100 | 8.40 | 6.67 | | 43.52 | 13.25 | 3.50 |
| | 0-15 | 8.21 | 2.05 | | 39.31 | 11.54 | 2.30 |
| 24 | 15-40 | 8.36 | 1.61 | 2560 | 47.31 | 18.96 | 2.50 |
| | 40-80 | 8.49 | 1.65 | | 45.24 | 12.27 | 2.50 |
| | 0-20 | 8.40 | 5.66 | | 46.92 | 8.94 | 2.10 |
| 25 | 20-50 | 7.50 | 1.86 | 4480 | 43.06 | 6.64 | 2.30 |
| | 50-80 | 8.60 | 3.95 | | 40.60 | 14.78 | 1.90 |
| | 0-15 | 8.02 | 1.06 | | 45.42 | 5.42 | 3.70 |
| 26 | 15-50 | 8.10 | 1.08 | 2240 | 43.76 | 5.40 | 3.50 |
| | 50-100 | 8.10 | 1.23 | | 43.51 | 5.50 | 3.50 |
| | 0-15 | 8.10 | 1.12 | | 39.10 | 5.58 | 2.40 |
| 27 | 15-60 | 8.15 | 1.21 | 2240 | 33.09 | 5.32 | 2.40 |
| | 60-100 | 8.20 | 1.23 | | 42.84 | 6.00 | 1.50 |

GWS: Ground Water Salinity

**Soil fertility:**

Data in Table (3) revealed that organic matter content is low, where it varied from 0.95% to 2.3% the decrease of OM content may be due to the increase of decomposition under high degree of temperature in arid and semi-arid region

**I. Land Capability Classification:**

Data in table (4) indicated that final index of land evaluation (F.I.L.E) ranges between 48.11% and 68.83

%, so the area could be classified as $C_2$ (good) and $C_3$ (fair). Concerning land capability limitation data revealed that the most limiting factors are soil factor and fertility status.

Accordingly, the main limiting properties for land capability of Rewena canal area at Kafr El-sheikh governorate are ground water depth (GWD) and hydraulic conductivity (as $K_S$) as a physical soil properties, soil salinity (ECe) and ground water salinity (GWS) as a chemical soil properties, soil organic matter content (OM%) and available macro nutrients (NPK) as a soil fertility. However there are no limiting factors concerning neither environmental conditions or irrigation water quality.

**2-Land suitability for crops:**

The land suitability classes for crops were determined by matching land qualities, climatic data (Table 5) and requirement throughout the suggested computer model.

**Table 3. Soil fertility properties of Rewena area**

| P. no. | Depth (cm) | OM % | Available (ppm) | | | Exch., meq/100g | |
|---|---|---|---|---|---|---|---|
| | | | N | P | $K^+$ | $Ca^{++}$ | Mg++ |
| 1 | 0-20 | 2.30 | 15.80 | 3.69 | 140.40 | 36.00 | 22.10 |
| | 20-65 | 1.90 | 15.00 | 4.01 | 143.60 | 26.38 | 28.43 |
| | 65-100 | | | | | 21.98 | 27.37 |
| 2 | 0-20 | 2.05 | 28.30 | 6.34 | 370.50 | 43.00 | 12.46 |
| | 20-60 | 1.95 | 26.10 | 5.90 | 372.40 | 45.36 | 20.20 |
| | 60-100 | | | | | 26.38 | 19.82 |
| 3 | 0-25 | 1.25 | 8.20 | 1.63 | 163.80 | 22.87 | 14.77 |
| | 25-70 | 1.04 | 10.20 | 3.40 | 160.20 | 21.78 | 17.26 |
| | 70-100 | | | | | 22.87 | 12.23 |
| 4 | 0-20 | 1.74 | 80.40 | 1.26 | 128.70 | 24.70 | 25.18 |
| | 20-50 | 1.30 | 69.50 | 2.14 | 130.50 | 25.74 | 11.50 |
| | 50-100 | | | | | 31.68 | 9.84 |
| 5 | 0-25 | 1.90 | 83.60 | 2.15 | 163.80 | 22.40 | 17.42 |
| | 25-65 | 1.60 | 80.40 | 2.50 | 166.70 | 29.70 | 15.38 |
| | 65-100 | | | | | 24.28 | 17.26 |
| 6 | 0-25 | 2.04 | 29.70 | 1.10 | 226.20 | 41.76 | 18.26 |
| | 25-70 | 1.60 | 25.20 | 0.98 | 216.30 | 34.07 | 25.95 |
| | 70-100 | | | | | 27.48 | 17.80 |
| 7 | 0-20 | 1.45 | 74.60 | 4.03 | 261.30 | 35.64 | 29.04 |
| | 20-60 | 1.20 | 61.50 | 5.12 | 280.50 | 37.62 | 23.14 |
| | 60-100 | | | | | 30.34 | 25.16 |
| 8 | 0-20 | 1.12 | 34.60 | 0.78 | 234.00 | 29.70 | 7.54 |
| | 20-55 | 1.04 | 30.10 | 1.20 | 225.00 | 27.72 | 27.16 |
| | 55-100 | | | | | 21.78 | 23.30 |
| 9 | 0-25 | 1.86 | 34.30 | 1.12 | 144.30 | 33.43 | 20.56 |
| | 25-65 | 1.46 | 36.10 | 3.10 | 146.50 | 36.22 | 20.35 |
| | 65-100 | | | | | 16.20 | 12.28 |
| 10 | 0-20 | 1.65 | 38.80 | 2.37 | 226.20 | 38.47 | 19.07 |
| | 20-60 | 1.05 | 41.50 | 2.40 | 231.50 | 30.31 | 11.06 |
| | 60-100 | | | | | 47.22 | 20.21 |
| 11 | 0-20 | 1.50 | 44.50 | 1.34 | 163.80 | 29.70 | 19.30 |
| | 20-55 | 1.20 | 38.60 | 1.61 | 170.50 | 25.74 | 21.36 |
| | 55-100 | | | | | 26.00 | 15.61 |
| 12 | 0-20 | 2.08 | 16.60 | 0.58 | 156.40 | 54.96 | 16.44 |
| | 20-55 | 1.70 | 18.50 | 1.15 | 161.30 | 43.96 | 23.24 |
| | 55-100 | | | | | 43.96 | 12.74 |

**Table 3. Cont**

| P. no. | Depth (cm) | OM % | Available (ppm) | | | Exch., meq/100g | |
|---|---|---|---|---|---|---|---|
| | | | N | P | $K^+$ | $Ca^{++}$ | Mg++ |
| 13 | 0-30 | 1.90 | 83.10 | 2.19 | 140.90 | 39.85 | 23.18 |
| | 30-60 | 1.20 | 75.80 | 2.20 | 150.30 | 26.16 | 17.36 |
| | 60-100 | | | | | 28.08 | 17.04 |
| 14 | 0-20 | 1.90 | 76.40 | 1.19 | 120.90 | 43.96 | 19.04 |
| | 20-60 | 0.95 | 73.10 | 2.14 | 126.10 | 43.96 | 21.14 |
| | 60-90 | | | | | 26.38 | 38.72 |
| 15 | 0-20 | 1.80 | 87.20 | 0.85 | 187.20 | 48.36 | 25.14 |
| | 20-50 | 1.20 | 81.40 | 1.10 | 191.40 | 48.36 | 25.14 |
| | 50-90 | | | | | 21.00 | 12.01 |
| 16 | 0-30 | 1.24 | 147.30 | 1.25 | 183.30 | 32.09 | 22.39 |
| | 30-60 | 1.05 | 136.10 | 1.80 | 191.50 | 25.75 | 9.13 |
| | 60-100 | | | | | 14.30 | 8.43 |
| 17 | 0-20 | 2.00 | 37.00 | 0.60 | 144.30 | 49.07 | 25.33 |
| | 20-60 | 1.50 | 35.10 | 1.20 | 150.60 | 43.16 | 35.64 |
| | 60-100 | | | | | 47.25 | 12.16 |
| 18 | 0-35 | 1.70 | 82.00 | 1.73 | 245.70 | 29.00 | 17.64 |
| | 35-75 | 1.30 | 68.40 | 1.90 | 255.20 | 29.85 | 15.67 |
| | 75-100 | | | | | 26.85 | 17.74 |
| 19 | 0-20 | 2.09 | 72.20 | 0.71 | 206.70 | 32.98 | 25.82 |
| | 20-50 | 1.60 | 70.50 | 0.91 | 186.70 | 26.38 | 36.62 |
| | 50-100 | | | | | 32.96 | 27.94 |
| 20 | 0-20 | 1.60 | 61.20 | 0.43 | 156.00 | 29.70 | 17.34 |
| | 20-60 | 1.20 | 52.80 | 1.60 | 140.80 | 33.66 | 21.22 |
| | 60-90 | | | | | 31.68 | 25.16 |
| 21 | 0-20 | 1.80 | 22.90 | 4.45 | 105.30 | 29.70 | 25.18 |
| | 20-50 | 1.43 | 24.30 | 3.60 | 115.40 | 38.13 | 21.46 |
| | 50-80 | | | | | 39.58 | 23.18 |
| 22 | 0-20 | 2.05 | 26.40 | 4.16 | 120.60 | 28.78 | 18.5 |
| | 20-55 | 1.70 | 25.30 | 3.99 | 123.20 | 24.18 | 17.94 |
| | 55-100 | | | | | 28.98 | 15.22 |
| 23 | 0-15 | 1.95 | 8.20 | 1.23 | 206.70 | 22.87 | 27.74 |
| | 15-45 | 1.60 | 12.60 | 3.60 | 196.80 | 22.54 | 25.32 |
| | 45-100 | | | | | 17.82 | 20.29 |
| 24 | 0-15 | 1.60 | 15.60 | 2.56 | 168.90 | 17.56 | 17.07 |
| | 15-40 | 1.00 | 16.70 | 3.12 | 171.60 | 25.06 | 14.23 |
| 25 | 0-20 | 1.70 | 14.40 | 2.91 | 226.20 | 19.58 | 1418 |
| | 20-50 | 0.90 | 16.20 | 3.01 | 190.20 | 16.16 | 17.36 |
| | 50-80 | | | | | 18.08 | 14.04 |
| 26 | 0-15 | 2.05 | 37.00 | 1.07 | 265.20 | 20.92 | 13.24 |
| | 15-60 | 1.70 | 38.00 | 2.05 | 220.40 | 24.56 | 13.04 |
| | 60-100 | | | | | 15.56 | 19.74 |
| 27 | 0-20 | 2.20 | 18.50 | 0.95 | 187.20 | 22.36 | 12.71 |
| | 20-60 | 1.80 | 20.60 | 1.04 | 168.00 | 18.36 | 17.98 |
| | 60-100 | | | | | 20.31 | 11.31 |

**Table 4. Land capability classes**

| P. no. | Soil Index | W. index | F. index | E. index | Final Index | Productivity Class | Constrains |
|---|---|---|---|---|---|---|---|
| 1 | fair | Excellent | poor | excellent | fair | 3 | GWD,GWS,N,P,K,OM. |
| 2 | fair | Excellent | fair | Excellent | good | 2 | GWS,,OM,P, |
| 3 | fair | Excellent | poor | good | fair | 3 | GWD.GWS,OM,N,P,K. |
| 4 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,ECe,OM, ,P,K. |
| 5 | fair | Excellent | fair | good | good | 2 | GWD,GWS,OM,P,K. |
| 6 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,OM,P. |
| 7 | fair | Excellent | fair | good | good | 2 | GWS,ECe,OM,P. |
| 8 | fair | Excellent | poor | good | fair | 3 | GWS,OM,P. |
| 9 | fair | Excellent | fair | good | fair | 3 | GWS,OM,P. |
| 10 | fair | Excellent | fair | good | good | 2 | GWS,OM,P. |
| 11 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,$K_s$,OM,P,K. |
| 12 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,$K_s$,OM,N,P,K. |
| 13 | poor | Excellent | poor | good | fair | 3 | GWD,GWS,$K_s$,OM,P,K. |
| 14 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,OM,P,K. |
| 15 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,OM,P,K. |
| 16 | fair | Excellent | poor | good | fair | 3 | soil struct.,GWS,OM,P,K. |
| 17 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,OM,P,K. |
| 18 | good | Excellent | poor | good | fair | 3 | GWS,OM,P,K.. |
| 19 | fair | Excellent | fair | good | fair | 3 | GWS,OM,P. |
| 20 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,OM,P,K,agronom. Processes |
| 21 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,OM,P,K |
| 22 | fair | Excellent | fair | good | fair | 3 | GWD,GWS,OM,P,K. |
| 23 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,OM,N,P. |
| 24 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,OM,N,P. |
| 25 | fair | Excellent | poor | good | fair | 3 | GWS,OM,P. |
| 26 | fair | Excellent | poor | good | fair | 3 | GWS,OM,N,P,K,agronom. Processes |
| 27 | fair | Excellent | poor | good | fair | 3 | GWD,GWS,OM,P,K. |

**Table 5. Climatic data during the period 2000-2008**

| Months | Temperature C | | | Rain- fall | Evaporat. mm/month | Relative Humidity | Wind Speed m/sec |
|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean | | | | |
| January | 18.42 | 6.5 | 12.46 | 13.6 | 61 | 80 | 1.29 |
| February | 19.9 | 7 | 13.45 | 12.8 | 66 | 78 | 1.37 |
| March | 22.7 | 8.6 | 15.65 | 5.91 | 75.01 | 76 | 1.7 |
| April | 26.86 | 10.84 | 18.85 | 2.78 | 90.4 | 69 | 1.41 |
| May | 30.2 | 14.5 | 22.35 | 0 | 107.4 | 65 | 1.2 |
| June | 32.1 | 17.8 | 24.95 | 0 | 119.5 | 64 | 1.1 |
| July | 33.8 | 19.86 | 26.48 | 0.2 | 127.6 | 74 | 1 |
| August | 31.5 | 19.5 | 26.2 | 0.4 | 126 | 76 | 1 |
| September | 28.9 | 18.6 | 25.05 | 0.9 | 119.9 | 75 | 1.2 |
| October | 24.8 | 15.7 | 22.3 | 3.5 | 107.5 | 75 | 1 |
| November | 24.8 | 12.5 | 18.65 | 6.25 | 90 | 77 | 1.02 |
| December | 20.66 | 8.5 | 14.58 | 12.95 | 69.9 | 81 | 1.1 |
| Winter | 19.56 | 9.8 | 16.18 | 9.17 | 64.75 | 77.8 | 1.25 |
| Summer | 31.09 | 16.87 | 23.98 | 0.65 | 115.13 | 70.5 | 1.15 |

## Table 6a. Land suitability indices for different vegetables and forage crops

| P. no. | Alfalfa % | Sorghum % | Onion % | Cabbage % | Pea % | Potato % | Pepper % | Tomato % | Water-melon % |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 79.80 | 85.96 | 37.82 | 86.23 | 78.07 | 29.79 | 39.63 | 48.53 | 40.91 |
| 2 | 35.31 | 85.89 | 30.50 | 90.28 | 73.56 | 69.43 | 37.69 | 46.41 | 36.03 |
| 3 | 80.23 | 84.41 | 38.13 | 88.73 | 70.40 | 31.75 | 38.75 | 45.69 | 37.04 |
| 4 | 82.29 | 83.29 | 33.35 | 83.80 | 75.39 | 29.99 | 33.89 | 46.13 | 34.99 |
| 5 | 35.49 | 88.04 | 31.13 | 92.54 | 85.96 | 72.69 | 40.41 | 47.57 | 38.63 |
| 6 | 35.49 | 88.04 | 29.40 | 92.54 | 85.96 | 72.69 | 39.85 | 35.16 | 38.63 |
| 7 | 70.20 | 747.23 | 20.18 | 73.67 | 69.54 | 25.58 | 37.85 | 36.16 | 31.35 |
| 8 | 84.20 | 87.66 | 37.86 | 88.08 | 85.59 | 32.96 | 39.72 | 34.34 | 38.47 |
| 9 | 78.67 | 83.39 | 33.34 | 83.79 | 75.78 | 27.76 | 33.88 | 42.64 | 32.39 |
| 10 | 79.28 | 82.55 | 32.76 | 82.94 | 79.70 | 29.56 | 32.80 | 35.40 | 32.06 |
| 11 | 87.22 | 78.68 | 38.14 | 82.70 | 71.12 | 31.35 | 33.50 | 40.10 | 34.52 |
| 12 | 90.82 | 33.44 | 36.10 | 33.60 | 77.12 | 28.60 | 34.12 | 36.10 | 33.20 |
| 13 | 87.62 | 81.82 | 37.91 | 82.21 | 76.36 | 32.61 | 35.44 | 45.60 | 35.90 |
| 14 | 80.40 | 88.28 | 36.44 | 88.70 | 76.29 | 31.74 | 38.23 | 45.60 | 39.46 |
| 15 | 82.52 | 89.93 | 37.55 | 90.36 | 87.80 | 32.70 | 40.74 | 47.96 | 39.46 |
| 16 | 70.29 | 87.83 | 31.16 | 91.85 | 78.99 | 29.60 | 33.67 | 42.81 | 34.77 |
| 17 | 82.73 | 85.07 | 35.52 | 89.91 | 83.05 | 31.40 | 39.05 | 40.21 | 37.33 |
| 18 | 74.30 | 92.77 | 33.60 | 96.24 | 90.57 | 32.90 | 42.03 | 49.40 | 40.71 |
| 19 | 82.69 | 82.88 | 33.14 | 83.28 | 74.92 | 28.87 | 33.67 | 42.81 | 34.77 |
| 20 | 35.04 | 87.17 | 33.56 | 91.62 | 78.79 | 70.46 | 38.25 | 47.1 | 36.56 |
| 21 | 80.53 | 81.19 | 35.06 | 85.34 | 79.27 | 30.54 | 37.27 | 43.87 | 35.63 |
| 22 | 85.53 | 89.46 | 29.71 | 92.81 | 87.34 | 33.59 | 41.85 | 47.71 | 40.53 |
| 23 | 24.69 | 79.11 | 38.10 | 89.81 | 84.51 | 62.24 | 37.13 | 45.72 | 34.38 |
| 24 | 82.73 | 91.81 | 35.77 | 92.25 | 79.33 | 32.59 | 39.76 | 47.42 | 40.29 |
| 25 | 70.30 | 90.37 | 37.78 | 93.75 | 88.23 | 23.83 | 41.87 | 47.73 | 40.55 |
| 26 | 26.43 | 91.89 | 22.30 | 95.33 | 89.71 | 24.26 | 42.57 | 48.53 | 41.23 |
| 27 | 82.60 | 91.91 | 38.44 | 92.35 | 86.91 | 35.85 | 41.82 | 47.68 | 41.82 |

## Table 6b . Land suitability indices for different field crops

| Profile no. | Wheat % | Barley % | Sunflower % | Sugerbeet % | Cotten % | Maize % | Fababean % | Rice % | Soya bean% |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 87.24 | 87.24 | 92.84 | 83.96 | 90.21 | 79.59 | 71.41 | 81.03 | 72.29 |
| 2 | 37.23 | 37.23 | 92.76 | 35.85 | 90.28 | 76.58 | 70.80 | 36.23 | 71.88 |
| 3 | 85.26 | 85.26 | 91.17 | 84.75 | 88.73 | 81.76 | 75.15 | 85.67 | 76.30 |
| 4 | 86.26 | 86.26 | 87.95 | 83.74 | 85.59 | 77.22 | 68.75 | 80.25 | 68.15 |
| 5 | 37.20 | 37.20 | 92.84 | 35.88 | 90.35 | 85.27 | 78.39 | 36.20 | 77.70 |
| 6 | 37.20 | 37.20 | 92.84 | 35.88 | 90.35 | 85.27 | 78.39 | 36.21 | 77.70 |
| 7 | 75.73 | 79.22 | 79.16 | 74.72 | 82.17 | 71..74 | 20.56 | 72.65 | 21.87 |
| 8 | 85.90 | 85.90 | 90.07 | 83.73 | 87.65 | 71.84 | 68.74 | 86.31 | 81.64 |
| 9 | 83.56 | 86.27 | 90.07 | 83.73 | 87.65 | 71.84 | 68.74 | 80.26 | 69.79 |
| 10 | 86.94 | 86.94 | 87.04 | 82.88 | 84.71 | 70.76 | 68.04 | 80.88 | 64.99 |
| 11 | 91.43 | 91.43 | 82.96 | 88.67 | 80.74 | 76.20 | 64.86 | 88.98 | 64.29 |
| 12 | 95.21 | 95.21 | 35.26 | 90.46 | 34.32 | 30.96 | 29.03 | 92.65 | 29.03 |
| 13 | 91.85 | 91.85 | 82.48 | 88.15 | 82.87 | 79.25 | 72.85 | 89.39 | 72.21 |
| 14 | 85.29 | 85.29 | 86.03 | 84.79 | 86.45 | 81.74 | 74.05 | 83.00 | 72.77 |
| 15 | 86.50 | 86.50 | 87.64 | 83.45 | 88.06 | 87.10 | 83.76 | 37.38 | 80.27 |
| 16 | 35.80 | 35.80 | 92.14 | 36.48 | 89.67 | 80.90 | 72.03 | 79.20 | 72.03 |
| 17 | 86.72 | 86.72 | 89.70 | 82.58 | 87.30 | 80.20 | 75.74 | 37.47 | 75.07 |
| 18 | 36.98 | 36.98 | 93.51 | 85.65 | 93.96 | 89.85 | 86.40 | 37.16 | 85.35 |
| 19 | 86.69 | 86.69 | 87.40 | 83.22 | 85.06 | 76.74 | 68.32 | 80.65 | 67.73 |
| 20 | 36.73 | 36.73 | 88.86 | 36.39 | 86.84 | 80.71 | 71.85 | 35.75 | 68.86 |
| 21 | 84.42 | 84.42 | 80.02 | 81.52 | 77.87 | 78.63 | 72.28 | 82.16 | 66.97 |
| 22 | 86.84 | 86.84 | 87.18 | 83.01 | 87.60 | 89.46 | 83.32 | 35.52 | 79.89 |
| 23 | 25.07 | 25.07 | 79.11 | 24.69 | 75.98 | 76.62 | 73.67 | 25.19 | 66.21 |
| 24 | 86.72 | 86.72 | 92.54 | 83.18 | 92.99 | 88.92 | 75.86 | 36.29 | 75.02 |
| 25 | 81.41 | 81.41 | 90.37 | 81.34 | 90.80 | 90.37 | 84.16 | 26.55 | 82.67 |
| 26 | 26.83 | 26.83 | 91.89 | 26.00 | 92.23 | 91.89 | 85.58 | 26.96 | 84.51 |
| 27 | 83.87 | 83.87 | 89.73 | 85.44 | 90.16 | 91.91 | 85.60 | 84.27 | 84.85 |

## Table 6c. Land suitability indices for different fruit trees

| P. no | Citrus % | Banana % | Olive % | Pear % | Date Palm % | Fig % |
|---|---|---|---|---|---|---|
| 1 | 29.33 | 67.39 | 42.71 | 66.79 | 33.06 | 31.60 |
| 2 | 73.21 | 31.09 | 37.53 | 30.69 | 32.80 | 32.40 |
| 3 | 33.26 | 74.49 | 36.89 | 73.52 | 34.57 | 32.00 |
| 4 | 28.44 | 64.49 | 35.23 | 63.65 | 31.98 | 30.57 |
| 5 | 74.46 | 31.42 | 37.20 | 70.83 | 76.51 | 70.83 |
| 6 | 74.46 | 31.40 | 37.30 | 68.18 | 73.54 | 71.60 |
| 7 | 56.40 | 31.21 | 32.33 | 64.20 | 31.21 | 27.63 |
| 8 | 34.48 | 78.58 | 38.31 | 77.48 | 34.32 | 33.24 |
| 9 | 29.42 | 66.71 | 35.29 | 65.85 | 33.07 | 30.62 |
| 10 | 28.15 | 64.99 | 34.87 | 64.15 | 31.65 | 31.20 |
| 11 | 30.70 | 73.82 | 33.24 | 72.87 | 33.00 | 32.16 |
| 12 | 30.23 | 76.87 | 36.01 | 75.87 | 32.46 | 31.15 |
| 13 | 32.65 | 77.58 | 34.57 | 76.57 | 32.81 | 31.78 |
| 14 | 30.62 | 69.74 | 35.20 | 67.11 | 30.54 | 30.54 |
| 15 | 31.21 | 72.14 | 35.86 | 71.20 | 31.06 | 30.60 |
| 16 | 72.36 | 71.25 | 37.54 | 78.68 | 79.02 | 73.16 |
| 17 | 31.69 | 73.25 | 35.94 | 72.30 | 32.56 | 32.16 |
| 18 | 77.44 | 32.67 | 39.19 | 32.25 | 77.06 | 74.64 |
| 19 | 27.38 | 62.76 | 35.02 | 63.96 | 31.78 | 30.38 |
| 20 | 68.13 | 48.90 | 34.76 | 74.08 | 70.92 | 67.80 |
| 21 | 35.63 | 29.64 | 33.26 | 29.26 | 59.61 | 60.42 |
| 22 | 32.05 | 74.84 | 35.56 | 30.90 | 73.80 | 29.92 |
| 23 | 37.16 | 48.12 | 35.60 | 23.42 | 40.12 | 26.50 |
| 24 | 34.10 | 73.25 | 38.79 | 72.30 | 32.80 | 31.76 |
| 25 | 23.86 | 64.30 | 37.09 | 71.91 | 32.52 | 22.78 |
| 26 | 24.26 | 46.30 | 37.71 | 23.82 | 32.16 | 22.43 |
| 27 | 34.95 | 78.99 | 39.00 | 77.97 | 33.84 | 33.84 |

The data (Tables 6a, 6b, 6c) revealed that, those soils are highly suitable for Wheat, Barley, and Sugarbeet, Sunflower, Rice, Sorghum, Cotton and Alfalfa. While it was suitable for Fababean, Soybean, Pear and Banana. It could be used for all crops expect Pepper, Olive, Fig and Peanut.

Maps (3, 4, 5 and 6) show the land suitability for some selected crops for Rewena area and indicate that; the most of the area around 85% was highly suitable for alfalfa, cabbage, wheat and sugar beet; where the highly suitable index (S1+S2) were 88.56, 85.53, 81.89 and 77.28 % respectively.

On the other hand very small area around 4 % was unsuitable for mentioned crops.

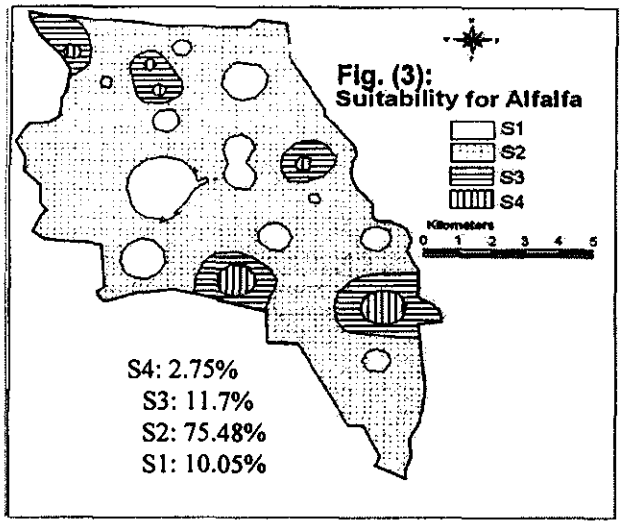
Also, table (6c) indicate that the most of the area was unsuitable for citrus cultivation.

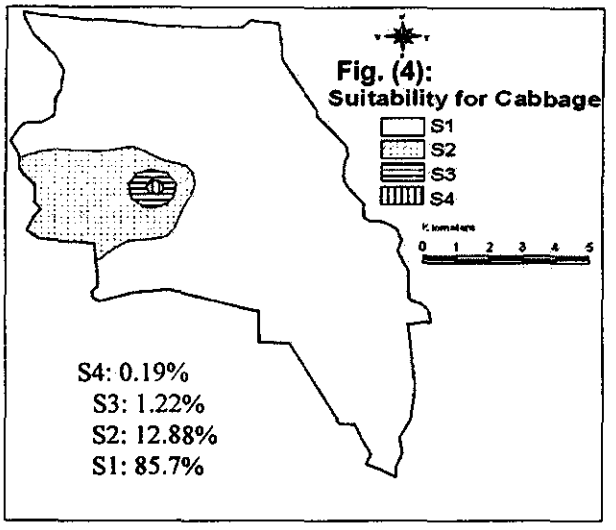
Concerning banana crop; map (Fig. 7) show that about 56.5% from total area were highly suitable while 4 % were unsuitable.

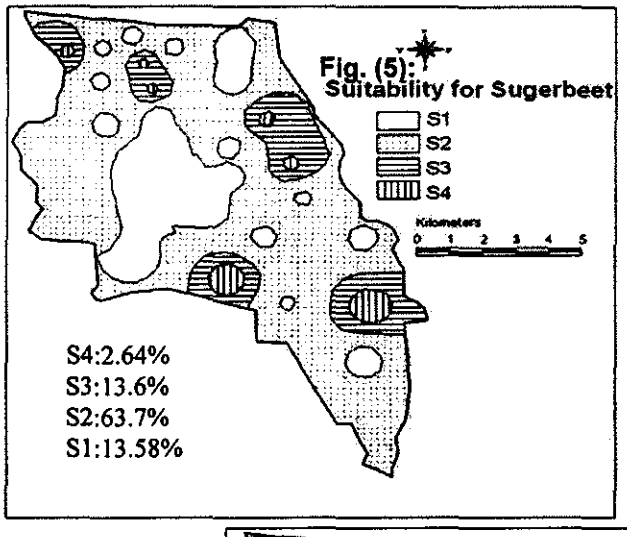
**Recommendation:**

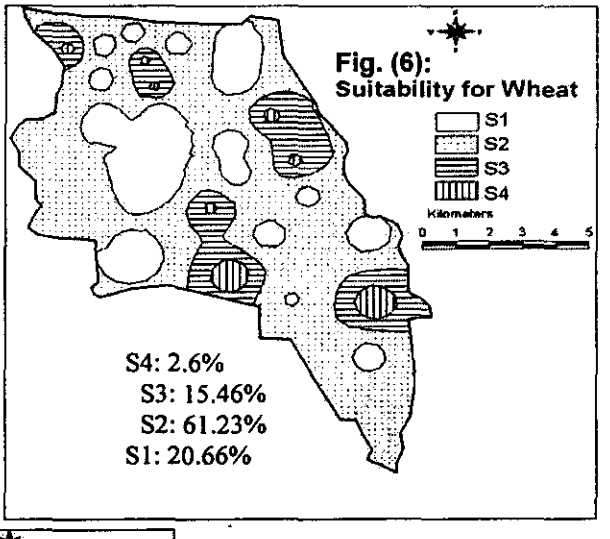
For maximizing the soil productivity of Rewena area it is recommended that;

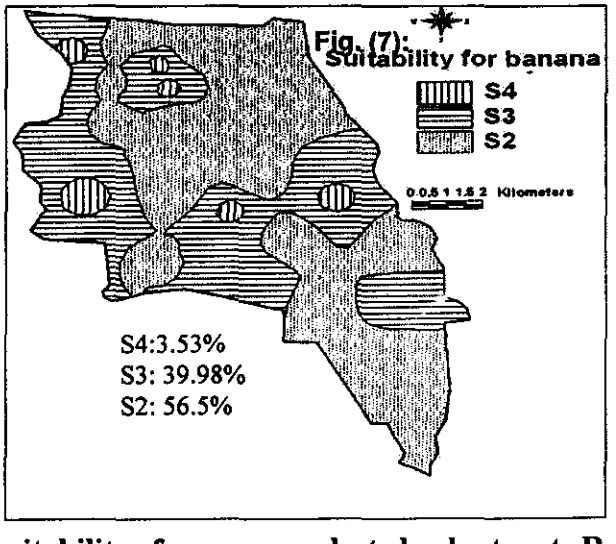
- Increasing the drainage efficiency, through periodical maintenances of title drainage system.
- Carrying out sub soiling processes to remove salts and /or hard pans which may exist in such heavy clay soil.
- Deep plowing should be carried out to prevent the upward movement of saline ground water to the soil surface through capillary rise.
- Application of organic matter and soil amendments, to improve physical soil properties and nutrient statues.
- Proper fertilization (type, time, amount and place of application) must be followed under the saline soil condition.




**Maps of land suitability for some selected plants at Rewena area showing%of the corresponded areas**

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## الملخص العربي

# تقييم الأراضي المروية القديمة (أراضى ترعه روينه) في محافظة كفر الشيخ منطقة شمال الدلتا

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تم استخدام الخصائص الكيماوية والطبيعية وموقف المغـــذيات وكذلك خصائص مياه الري والماء الأرضي والظروف البيئية المختلفة كمدخلات لبرنامج ASLE الذي تم استخدامه في حساب القـــدرة الإنتاجية للتربة ومدى ملاءمتها لمختلف المحاصيل واوضحت النتائج أن:-

المساحة التي تمت دراستها تقع في الرتب الإنتاجية الآتية: الرتبة الثانية (جيدة)، والرتبة الثالثة (متوسطة).

كانت أهم المحددات لمقدرة الأرض الإنتاجية تتمثل في انخفاض نفاذية الأرض وارتفاع مستوى الماء الارضى وكذلك ارتفاع ملوحة التربة والماء الارضى وانخفاض محتوى الأرض من المـــادة العـــضوية والمغذيات، خاصة النتروجين والفسفور والبوتاسيوم.

فيما يتعلق بملائمة الأرض لمختلف المحاصيل تلاحظ أن هـــذه الأرض تلائم كل المحاصيل فيما عدا الفلفل- الـــتين - الزيتـــون - الفول السوداني.

ومن الممكن ترتيب ملائمة التربة للمحاصيل في الترتيب التنازلي التالي:

الشعير > القمح > بنجر السكر > عباد الشمس > القطـــن > الأرز.

ولتعظيم الأنتاجيه في هذه الأراضي موضع الدراسة يجـــب إتباع التوصيات التالية:

زيادة كفاءة الصرف بالصيانة الدورية لنظام الصرف المغطـــى واستخدام وسائل الصرف المساعده

القيام بعمليات الحرث تحت التربة لإزالة الأمـــلاح الزائـــدة والطبقات الصماء وبخاصة في الأراضي الطينية الثقيلة.

الخدمة العميقة لمنع ارتفاع الماء الأرضي مرتفع الملوحة بالخاصية الشعرية إلى سطح التربة.

أضافه المادة العضوية ومحسنات التربة لتحسين خواص التربـــة الفزيائيه وحاله المغذيات.

الاهتمام بالتسميد (النوع، والزمن، الكمية ومكان الإضـــافة) التي يجب إن تضاف في حاله الأراضى الملحية.