Soil fertility and suitability Evaluation for barley cultivation using GIS in an arid region in SYRIA

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INTRODUCTION

The soil fertility Evaluation of agricultural areas will become more important in the coming years due to the growing concern for achieving food security and increasing agricultural production. Especially in arid and semi-arid regions. the soil fertility is therefore necessary to improve and sustain agro-ecosystems (Yageta et al, 2019), sustainability agricultural is a major target in all world countries, its purpose is Balancing the inherent land resources with crop requisites, the evaluation of soil suitability for sustainable agriculture is a relevant tool for choosing suitable land for agricultural production at a minimal economic and environmental costs.

GIS (Geographic Information System) land suitability maps were developed in many regions around the world to contribute in achieving the sustainable agriculture and eventually the food security (Krishna and Regil, 2014).

This study was conducted to evaluate soil fertility and land suitability for barley cultivation, and to prepare the fertility and suitability mapping during 2022 using GIS, in a chosen area in Al Hasaka Governorate (Wadi Khribet Al Maliha).

METHODOLOGY

The district covers an area of 41,895 hectares. with 35°47'00" to 36°1'00" north latitude and 40°19'00" to 40°39'00" east longitude. it is often consists of uncultivated lands. It follows The Agricultural Land Evaluation System for arid and semi-arid regions.

A geo-pedological soil survey was done, 121 land points were studied to test the differences on physiographical unit's map and to choose and prepare 10 soil profiles in different sites, the diagnosing characters and classification of soil was done according to USDA soil taxonomy (Soil Survey Staff,2010).

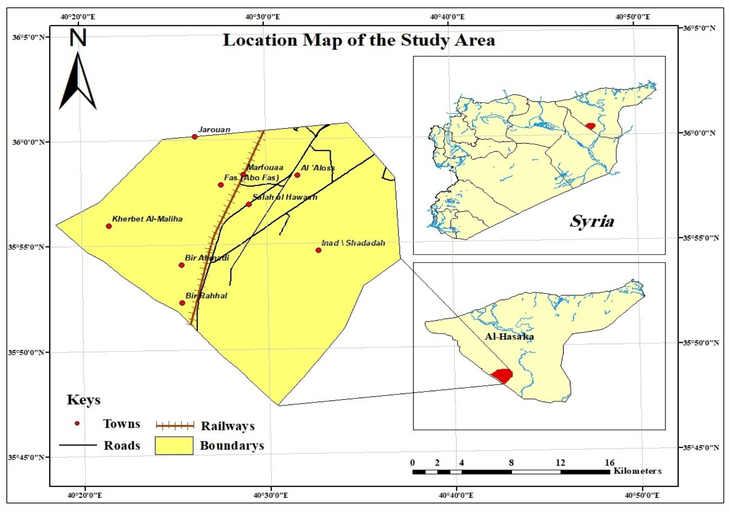

Fig.1.Location map of Study area, Wadi kherbat ALmliha, AL-Hasaka province (Syria)

Soil samples were collected according to the horizons in the soil profile. The samples were air-dried, crushed and sieved at 2 mm, and analyzed for the different soil fertility indicators: slope. soil texture, soil depth, organic matter content, calcium carbonate content ($CaCO_3$), available P. gypsum content ($CaSO_4.2H_2O$),capacity (CEC). pH, and electrical conductivity (EC).
to compute soil fertility index (SFI). The parametric method (Square-Root) was used (Sağlam and Dengiz 2014), Lands were evaluated by intersecting barley crop requirements with land and climate characteristics using ArcGIS 10.8 program under the GIS platform.

Results and discussion

Results of Soil Fertility Index According to the parametric method (Square-Root) used in the study showed that 20.6 %, 52.09 %, 27.31% of the area were high, moderate and low fertility, respectively.

The results of the soil suitability classification for barley cultivation indicate that, the most units fall under the moderately suitable class (S2) which represents 45.90 % of the total area (the main limiting factor was depth), after removing the determining factor, it becomes suitable in the future.

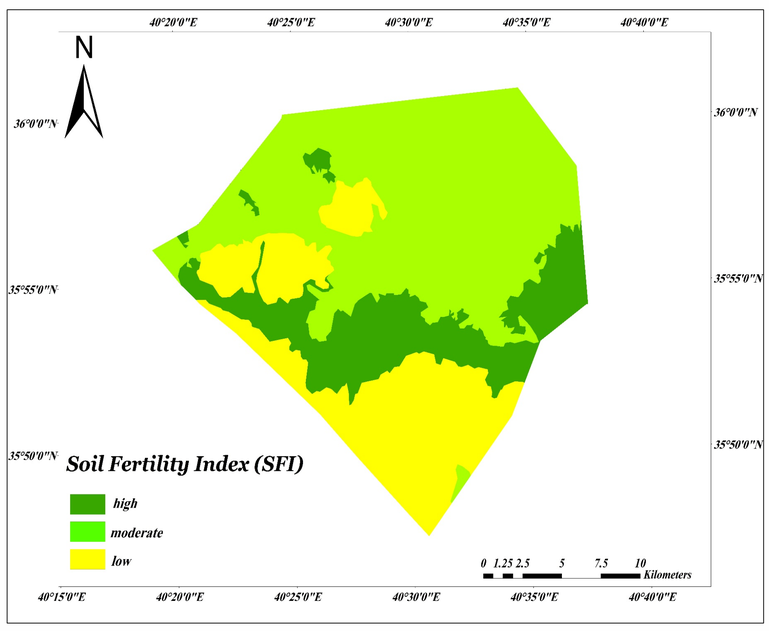

Fig.2. Soil Fertility Index (SFI)

The highly suitable class (S1) for barly cultivation covers 17.00 %. Of the whole area. While marginally class (S3) covers about 37.10 % of the whole study area due to the presence of medium to high determines in soil parameters (The limiting factors were texture, pH, and available phosphor).

After removing the determining factors in the future by reforming this class, might convert into suitable class S1.

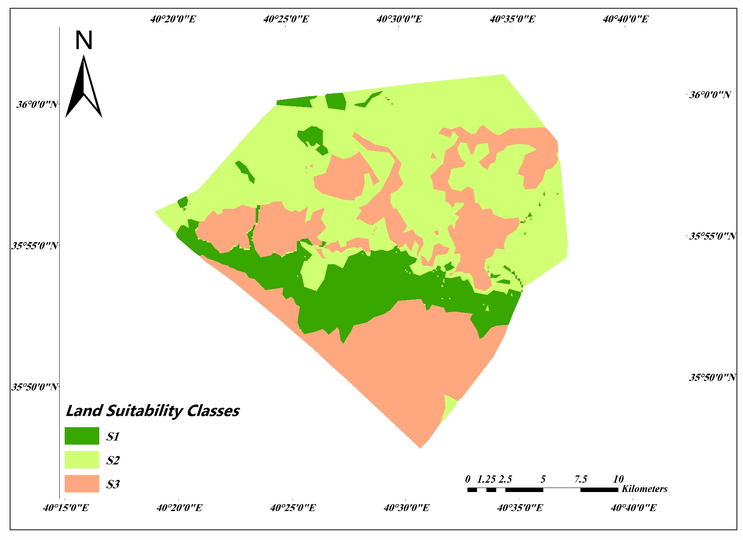

Fig.3. Land Suitability classes

CONCLUSIONS

Soil fertility can be evaluated to help identify regions that have problems or needed, Soil fertility and land suitability maps for growing barley, generated using GIS, can improve planning alternatives with a purposeful strategy to obtain optimal management, and utilization of available land resources for sustainable barley crop production.

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