Inserting some morphological soil characteristics to modifying storie's index for rating the agricultural value of soils

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Abstract

In this paper, the term "storie's index for rating soils "is used by inserting some morphological soil characteristics for rating the agriculture value of soils. Such a soil index would be useful in land classification and land evaluation, and used to express the relative ratings. Soils which show highest productive capacity (from the study of the soil under field conditions according to the specification and characterizations which obtain during the study of soil in the field and cleared within soil survey reports and maps)are rated at %١٠٠ .

The rating is based on the study four general factors (the storie index):-

A. characteristics of soil pedon; B .texture; C. slope; and X. modifying conditions (some morphological characteristics)

Characteristics listed under factor X, modifying characteristics consist of drainage conditions, fertility, stoniness, etc.….

The index is the product of rating given each of these four factors, A x B x C x X, the ratings and final index being expressed in percentages. By using this method of rating soils, we can obtain a large number of various tracts of land can be compared from the soil stand point.

According to the study we indicate that soils are varies in their productive capability and capacity. Because of absents of rules or legislation in our region for rating value of soils, there is need for some methods of comparing the relative productivity of deferent soil especially in Kurdistan region ascribed to a large number of widely divergent soil conditions.

Despite, this index (index for rating agricultural value of soil) can be use as bases for judging soils.

Key worlds: storie's index, soil morphological characteristics, land evaluation and rating.

Introduction

The growth and production of plants is Dependent directly on the soil, particularly the degree to which the soil presents suitable conditions favorable for development of plant roots. (Vink; ١٩٧٥).

Soils play a pivotal role in the overall development of a country, especially in the field of agriculture. Now it is well understood that soil survey, researches, and its interpretations is most essential for soilfoundations of a country as its basic developments is concerned.

Date of receiving ٢٨/٤/٢٠١٠

Soil surveys are concerned with the description of properties of the soils, their classification and mapping as they exist in nature, including collection of the related information on the physical features of the mapped area like land forms, climate, vegetation, drainage, and other kinds of land use. All the above information is used for the preparation of Soil report and accompanying maps, including interpretive maps. (Storie;١٩٣٣).

This information is supplemented with voluminous analytical data on physical and chemical properties of the soils from the laboratory. All this is required for distinguishing the soils from one another and for classifying them and also for posterity and ratability value of agricultural lands. (Storie ; ١٩٣٤)

The inventory of soil resource of a place or area can be prepared by conducting systematic soil surveys.

The study of land qualities is an essential factor in the development of more complicated systems of land evaluation. (Weir & Storie / ١٩٣٦)

The growth of plants on the soil is closely related to these characteristics of the pedon, and the chemical composition and physical characteristics of the several horizons of the soil is likewise so closely

related to the pedon that it appears possible to rate the soils with the pedon characteristics as a base index for rating which gives direct information about this differentiating characteristics. It also gives information about other, accessory characteristics Co-value with them.

The nature of this study is the first of its kind in Iraq Kurdistan region. It keeps the door open for more detailed investigations, because such ratings cannot be final and in fallible and may be changed as experience with the use of the soil indices. The objective of this study deals briefly with:-

١. Modifying of Storie's index factors.
٢. Rating the agricultural value of soils by using the information which submitted by a detailed and accurate soil survey.

The index for rating soils which used by Storie was a numerical expression of the degree to which a particular soil presents conditions favorable for plant growth and crop there fore pedon characteristics can be considered as a good base for rating was based on soil characteristics which govern its potential utilization and productive capacity.

For arriving at the relative index of soils he considered four general factors which are: - (A) the characteristics of the soil pedon , (B) soil texture, (C) soil or land slope and (X) other modifies factors. Each of these factors is evaluated on the bases of % ١٠٠ for the most favorable condition. (Storie, Previced;١٩٨٧).

According to the major expression with a high progress leap in different life aspects in Iraqi society as a whole and Kurdistan region especially, which caused in making exchange in utilizing agricultural and rating without any limitation, and the absence of adequate studies, however ,due to the instability of the stunt in rating the agricultural value of soils in Iraqi Kurdistan region, and because of the absence of standard characteristics for the rating the agricultural value of soils depending on the reports and maps accompanied of soil survey and classification of soils and lands , with modifying Stories' index by inserting some soil morphological characteristics. A useful contribution to this kind or field was the introduction of parametric methods in to land evaluation.

One of the earliest methods was devised by R.Earl Storie (١٩٣٣).This method of soil rating known as the Storie index. The Storie index for lands has long been one other green light in a very difficult period with regard to land evaluation. The Storie index of soil characteristics that govern the soils and lands potential utilization and productive capacity. (Storie; ١٩٣٧).

Storie used a simple formula to arriving his relative index of soils, which were four factors as conceded by him. There are: (A) character is the soil pedon; (B) soil texture ;(C) evaluate slope; and factor(X) for any modifying factors.

Obviously, this kind of ratings cannot be final and infallible and may be changed as experience with the use of the soil indicates.

Methodology

In arriving at the ratings, the experience and judgment of the workers engaged in soil survey work in Girdarasha which is apart of wide **ERBIL** plain, has been called upon, and the ratings express the results of there collective studies of these several conditions of the soil to growth and production of plants.

The most common method for rating the agricultural value of soils which used was Sorie's index, and the characteristics of soil which included soil survey and consider as a modifying for Storie's index.

Results and discussion

It seems from previous land rating or evaluation that there is no criterion for such process. It can base on the experience and the experts. Agricultural lands indicated that there are stagnancies in the complete studies of the laws and legislation which control or ruled the rating of the land or rating of the soil for a tract of land.

As the mentioned above we suggest a number of factors, which deal with soil characteristics that govern the productivity and rating the agricultural value of soil and rating the soils for a tract of land, as shown in table (١) and which consider as a soil-rating chart in our region.

As an example , a soil my have an idle pedon condition warranting a rating of ١٠٠ per cent for factor A , idle service –soil conditions giving ١٠٠ per cent for factor B, but a bad salt accumulation that would give a rating of ٢٠ per cent for factor C .

Multiplying these three percentage ratings / A* B * C / gives ٢٠ per cent as the index for this soil. The accumulation of salt would dominate the quality of this soil, rendering it wholly unproductive for plants and would justify the index of ٢٠ for the soil.

If we want to rate the soil for a tract of land, it can be done by the knowing index for each soil type in the tract, which is calculated separately, and then a rating soil for each intern tract is obtain by weighing soil index according to the proportion of the acreage of that soil in the tract.

If we want to use the soil map of any soil survey report, the rating of tract can be calculated as follows:-

A- Index for the area DM٩٥ (Hikteriyah clay loam, nearly level).(Ahmedi ;١٩٧٥)

Factor	Rate %
Factor A: Hektoriyal series, pedon Group II…	١٠٠
Factor B: Clay loam texture	٩٠
Factor C: Slope nearly level	١٠٠
Factor X: ٢-٤mmohs	٧٠
Index rating :=١٠٠٪ x ٩٠٪ x١٠٠٪ x٧٠٪	٦٣

B- Index for the area DE٩٧ series (Bakir silt clay loam gently slopes):(Ismail;٢٠٠٤).

Factor	Rate %
Factor A: Bakirseries, pedon, Group ١:	١٠٠
Factor B:-silt clay loam texture	٧٠
Factor C: gently slope	١٠٠
Factor X: class ٢	٢٨
Index rating ١٠٠٪X٧٠٪X١٠٠٪X٢٨٪	١٩,٦

C- Index for area DE ١١٦ series (Muhammad loam, nearly level): Ismail;٢٠٠٤).This is old alluvial soil, deep, friable, excessively drained

Factor	Rate %
FactorA: Muhammad series, pedon group I	١٠٠
Factor B: loam texture	١٠٠
Factor: Gently level	١٠٠
Factor X: moderate drill erosion with cracks	٨٠
Index rating : ١٠٠٪X١٠٠٪X١٠٠٪X٨٠٪	٨٠

D- The index for the entire tract shown on the map may be calculated if we wanted, according to the acreage of any soil as follows:-

Series	Index	Acreage	(I X A)*
Hikteriyah clay loam	٦٣٪	١٣	٨٩١
Mohammed loam	١٩,٦٪	٦	١١٧,٦
Bekir silt clay loam	٨٠	٨	٦٤٠
Total		٢٧	١٦٤٨,٦

* Index multiply Acreage =١٦٤٨,٦/٢٧
Index rating for tract = ٦١,٠٦ %

According to the range in index rating of soil that accurse , we can obtains different grades or classes of soils by combining soils having a specified range in index rating .We can separated the soils of Erbil plain in a number of grades starting from grade No.١ designating the best soil and ٦ or ٨ the poorest . Some times the symbols A, B and C… etc. Used to indicate good medium and poor soils. The used number or symbols(١ or A) soils indicating soils of high productivity ,(٢ or B) indicating soils of moderate productivity, (٣ or C) soils of low productivity and (٤ or D) indicating soils of semi arable etc.…..

Conclusion

From our study of rating agricultural soil value, that this kind of ratings in our country was depended on experience of workers in this field only, because stagnancy of rules and legislation, for this we used a method of modifying Storie's index, which depended on soil survey data for rating agricultural soil value, which interrogate a justice and equity.

From the above we concluded that the rating of soils by depending on modifying Storie's index is the best way or methods to justifying the rating of soil tract in our country.

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Table number (١): other morphological characterization (X)which modifying and added to store index

Character / Degree	Range/degree or percent ration					
Horizon depth	>١ inches	١ – ٢ inches	٢ – ٣ inches	٣ – ٤ inches	٤ – ٦ inches	<٦ inches
	٥ – ٢٠	٢٠ – ٣٠	٣٠ – ٤٠	٤٠ – ٥٠	٥٠ – ٨٠	٨٠ – ١٠٠
texture	Moderate	Fine	Medium coarse	Medium fine	Coarse	Stony fine
	١٠٠	٥٠ – ٧٠	٣٠ – ٩٠	٥٠ – ٩٠	٥٠ – ٧٠	٧٠
slope	٠٪ - ٢٪	٣٪ - ٨٪	٩٪ - ١٥٪	١٦٪ - ٣٠٪	٣١٪ - ٤٥٪	>٤٥٪
	١٠٠	٨٥ – ١٠٠	٨٠ – ٩٥	٧٠ – ٨٠	٥٠-٨٠	١٥
Land class	Excellent	Good	Medium	Medium poor	Poor	Very poor
	٨٠ - ١٠٠	٦٠-٧٩	٤٠ - ٥٩	٢٠ - ٣٩	١٠ - ١٩	<١٠
Drainage *	Excellent	Good	Medium	Imperfect	Poor	Very poor
	١٠٠	٨٠ – ٩٠	٦٠ – ٨٠	٤٠ – ٧٠	١٠ – ٤٠	Deference degrees
Fertility (N.P.K.)	Very high	High	good	Moderate	Poor	Very poor
	١٠٠	٩٥ – ١٠٠	٨٥ – ٩٥	٦٥ – ٨٥	٦٥ – ٨٠	٥٠ – ٦٠
Salinity	Free	٢ – ٤	٤ – ٨	٨ – ١٢	١٢ – ١٦	>١٦
	١٠٠	٧٠	٤٥	٢٥	١٠	٥

Erosion	Without	١st degree	٢nd degree	٣rd degree	٤th degree	٥th degree
	١٠٠	٩٠	٨٠	٦٠	٤٠	٢٠
Hard (horizon) Pam	Without	٢ – ٢,٥m	١,٥ – ٢m	١,٥ – ١m	١ – ٠,٥m	On surface
	٣٦	٣٠	٢٤	٦	٤	٢
Stoniness	١st class	٢nd class	٣rd class	٤th class	٥th class	٦th class
	٣٥	٣٨	٣١	١٤	٧	٣
Glyezation	Along year	١٠month/year	٨month/year	٦month/year	٤month/year	٢month/year
	٥ – ٢٠	٢٠ – ٤٠	٤٠ – ٦٠	٦٠ – ٨٠	٨٠ – ٩٠	٩٠ - ١٠٠
Farness from city	Inside the city	٠ – ٢٠km	٢٠ – ٤٠km	٤٠ – ٦٠km	٦٠ – ٨٠ km	٨٠ – ١٠٠ km
	١٠٠ – ٨٠	٨٥ - ٧٠	٧٠ – ٥٥	٥٥ – ٤٠	٤٠ – ٢٥	<٢٥
Social stage	Nomad	Transfer	Phyla	Uneducated	Simi educate	educated
	٠ – ٢٠	٢٠ – ٣٥	٢٠ – ٣٥	٣٥ – ٥٠	٥٠ – ٦٥	٦٥ – ٩٠
Security stage	Excellent	Twice	Four one	Six one	Eight one	١٠ one
	١٠٠ – ٨٠	٨٠ – ٦٥	٦٥ – ٥٥	٥٥ – ٤٠	٤٠ - ٢٥	٢٥ - ١٠
Devolution stage	١st year	After ٥ year	After ١٠ year	After ١٥ year	After ٢٠ year	After ٢٥ year
	٦٠	٥٠	٤٠	٣٠	٢٠	١٠
Farness from water resource	Inside the farm	٠_٢٠	٢٠_٤٠	٤٠_٦٠	٦٠_٨٠	٨٠_١٠٠
	١٠٠_٨٠	٨١_٧٠	٦٩_٥٥	٥٤_٤٠	٣٩_٢٥	>٢٥
	١٠٠_٨٠	٧٩_٦٨	٦٧_٥٦	٥٥_٣٤	٣٣_٢٤	>٢٤
* Other characterization						

إقحام بعض الخصائص الشكلية لتحوير دليل ستوري لتخمين قيمة الترب الزراعية

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الخلاصة

في هذا البحث، مصطلح " دليل ستوري لتخمين الترب " استعملت بإقحام بعض الخصائص المورفولوجية لتخمين القيمة الزراعية للترب، ان مثل هذا الدليل للتربة يكون مفيدا في تصنيف وتقييم الارض ويستعمل في التعبير عن التخمينات النسبية .

الترب التي تبين سعة انتاجية عالية (من دراسة التربة تحت الظروف الحقلية استنادا لخصوصية الخصائص التي تستحصل من خلال دراسة التربة في الحقل والموضحة ضمن تقارير مسح التربة والخرائط) تخمن ب ١٠٠% .

التخمين يستند على دراسة اربعة عوامل عامة في (دليل ستوري): A - مقد التربة ، B – نسجة التربة ، C – الانحدار، X – الظروف المحورة (الحالات التحويرية) او بعض الاحيان تسمى الخصائص الشكلية المسجلة تحت العامل X ، الخصائص المحورة تحتوي على ظروف البزل ، الخصوبة ، الحجرية ، .....الخ .

الدليل ناتج تخمين لكل من العوامل الاربعة A * B * C * X التخمينات والدليل النهائي تعبر بالنسبة المئوية باستعمال هذه الطريقة لتخمين الترب نتمكن من الحصول على عدد كبير من قطع الاراضي يمكن مقارنتها بحسب وجهة نظر التربة .

واستنادا الى الدراسة توضح ان الترب تختلف في القابلية الانتاجية وسعتها بسبب غياب القواعد او التشريعات في منطقتنا لتخمين قيم الترب ، هنالك حاجة لبعض الطرائق لمقارنة الانتاجية النسبية لمختلف الترب خاصة في منطقة كردستان والتي تعزو الى عدد كبير من الاختلافات الواسعة لظروف / حالة التربة .