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Research Article

QUALITATIVE ASSESSMENT OF LAND RAITING AND ESTIMATING THE BIOMASS NET PRODUCTION (BN) AND RICE PRODUCTION POTENTIAL(Y) IN JAYDAR PLAIN OF POLEDOKHTAR–LORESTAN

***Zeinvand M. and Sohrabi A.**
Department of Soil Science, Faculty of Agriculture, Lorestan University, Khorramabad, Iran
**Author for Correspondence*

ABSTRACT
Today, the need of timized usage of agricultural lands is more and more because of the population growth. The study area is about 3864 hectares that was carried out in 33° 6´ - 33° 10´ north latitude and 47 º 37´ - 47 º 44´ east longitude. The study area is considered as an area with desert and hot climate and the winter is midland humid and the summer is long, hot and dry. The average of annual temperature is 22.6ºC, the annual evaporation is about 2800 mm and the rainfall is more than 360 mm. The maximum average of the temperature is 27.2ºC and the minimum average of it is 16.5 ºC. The maximum amount of rainfall and the minimum amount of temperature according to the data gathered in the synoptic meteorological station, is in January and December. The data that is achieved based on general American classification shows that the soil in the studied area belongs to inspetisoil and entisoil groups. One way to increase the production rate and optimized usage of the lands is recognizing the production capacity of the land and choosing the appropriate application of it based of production capacity. In this method, the operation is computed regardless of each kind of limitation such as soil, water and management. One important and applicable method in order to have optimized usage of the soil resources is determining the capacity and potential of the lands. One of these methods is to estimate the potential of the product operation in ideal and optimized conditions. In this method, the operation is computed regardless of each kind of limitations, such as soil, water and management. In this research the net production of biomass (Bn) and operation potential(y) of the rice in jaydar lands in poldokhtar in lorestan by the use of the weather reports of synoptic station of poldokhtar is estimated. The result shows that the amount of operation for rice regardless of soil, water and management limitations equals 8tons and469 kilograms in dry matter hectare, and 9 tons and 654kilogarams in humid matter hectare. Considering this matter that the observed operation in this area equals 3 ton in each hectare, we can increase this amount to9 tons and 654 kilograms by applying proper management and eliminating the reparable limitations. Also, the qualitative assessment of the land proportion for rice was done in jaydar based on the parametric method. The results showed that for producing rice in this area proportion class in from S_2 to N_2 and the most limiting factors in these lands are slope and the percentage of plaster, subsequently.

Keywords*: Qualitative Proportion of Lands, Net production of Biomass, Rice, Jaydar Soils*

INTRODUCTION
In today's world, as a result of increasing growth of population and the expansions of cities, increasing the cultivating lands is decreased gradually therefore there is a serious need for an optimized usage of the lands. The main purpose of assessment of the lands is to have an optimized and stable usage of the lands by investigating the physical, social and economically aspects (Givi, 1999).
In different parts of the world specially, in developing and less developed countries, natural resources and lands are used to eliminate the instant and every day needs ignoring their capacities and potentials. This causes serious and irreparable damage to these resources. in order to stop more destructions of these resources, their capacity and proportions for special efficiencies must be considered by the agricultural practioners (Damavandi *et al.*, 2005) farming has been the primitive job of today's civilized human that is changed from traditional farming in to developed and e*act farming the population growth and the progress of civilization caused people to habit in one area, and know more productions and farm in one place for many years (Parkash, 2003). The soil is one of the most valuable and important natural

resources and it is the most basic. Forminy factors of civilization so that we can say there is correlation between the human civilization progress with soil and the howness of using it (Jafarzade and Abbasi, 2006).

Land assessment is the process of predicting and determining the land potential according to the land characteristics for special application. In general assessment methods the land is assessed for total usages (Rossiter, 1996). Regardless of the details of the land usage. The purpose of assessment lands by investigating the physical, social and economically aspects qualitative assessment belongs to a kind of classification that the proportion amount is done in a qualitative way.

The classes are determined based on the physical production of the land and the proportion is inspected without enact computing of the incomes and enpenses (FAO, 1976; Parkash, 2003). Qualitative or physical assessment makes maximum usage of the resources, possible (Delaroza *et al.*, 2004).

Many researchers have been done about the quantitative and qualitative proportion of the land also about determining the capacity of the lands. For example qualitative classifying of the research station of khaje in Orumia Plain in Kerman for wheat, barley, alfalfa and safflower, using parametric method by Malekian and Jafarzade (2010), quantitative and qualitative assessing of land proportion in Gotv and water for wheat and potato by Yazdani and radiation-thermal production potential, sugar beet by FAO method in lands of Agricultural University of Lorestan, and comparing it with Silakhor plain by Sohrabi (2004). Assessing the radiation-thermal potential by FAO method, makes it possible to estimate the Biomass production by using the information related though the impact of soil, water and management limitations on radiation-thermal potential (Givi, 2000). This method has simple suppositions that make it possible to simply estimate the amount of Biomass and economical operation of many one-year productions that have no pests and diseases and are in good condition from the aspect of water and nutrition (Sys *et al.*, 1991).

Seydjalali (2000) computed the production potential and land proportion for dry land and water wheat in Mian-abshushtar lands. Givi (2000) computed the production of wheat, barley, rice, potato and alfalfa in lands of Falavarjan in Isfahan Province by use of FAO method. Rice belongs to Poaceae (Gramineae) group and Oryzeae tribe. Its spikes are placed individually and with a little distance from each other, on the panykl. Each spike contains one fertile floret and each floret has two short glumes.

That is cultivated and farmed as a crop plant, is Diploid (2n=24) and has six flags. Rice is known as a one-year crop plant. Rice is farmed in many places from 50 degrees of northern latitude to 40 degrees southern latitude, from lands under the sea level to those that are more than 2500 meters above the sealevel cultivation than plays an important role in nutrition of millions of people all over the world, has a 7000-year old history in India and china. The 90 percent of rice production belongs to Asia and the civilization of this part of the word has a deep correlation with rice. Rice grain that is used in human nutrition contains 7.7 percent protein, %0.4 fat, 2.2percent Cellulose and %0.5 ash.

Digestibility of rice is more than potato, rgebread and wheat, milk and other food productions. Rice has superiority over most food products from the aspects of food value and the amount of productive calorie.

Rice cultivation is common in humid and tropical areas and also in semi-dry areas (Noormohammadi and Siadat, 2008).

For the first time in Iran the studies of assessment of land proportion in a qualitative way by the use of land assessment rules of FAO was done by Naiini (1994) in Northern lands of Iran for important agricultural products of Gorgan. Baninema and seydJalali did the qualitative and quantitative assessment of land proportion in Behbahanareas for important cultivation products. Sustainable land management's a possible solution for the natural resources (Marmoot and Asvaran, 2001).

Wilson (1991) did the land assessment for Musmmenjulaten area in Australia for sugarcane, banana, palmtree, manys, avocado, tea, vegetables pumpkins, pineapple, sorghum, corn, sweet corn, soya, peanut, potato, rye rise and improved pastures. The limitations were: land, the amount of food elements of the soil, soil saltiness, available water, soil wetness. Physical condition of the soil, to pography, flood prevention rocky outcrops and erosion. Givi (2000) predicted the production of wheat, barley, rice, potato, onion and alfalfa in lands of Falavarjan in Isfahan.

MATERIALS AND METHODS

Study Area

The study area is named jaydar and is about 3864 hectares. That is mostly located in west and south of Poldokhtar, in Lorestan province. This area is placed between 47 degrees and 37 minutes to 47 degrees and 44 minutes of eastern longitude and 33 degrees and 6 minutes to 33 degrees and 10 minutes northern latitude. The studied area is considered as an area with desert and hot climate and the winter is mild and humid and the summer is hot, long and dry, there the average of annual temperature is 22.6ºC, The annual evaporation is about 2800 mm and the rainfall is more than 360 mm. the maximum average of the temperature is 27.2ºC and the minimum average of it is 16.5 ºC. The most amount of rainfall and the minimum amount of temperature according to the data gathered in the synoptic meteorological station, is in January and December. In this area the soil is classified in to 9 series (soil series number 1,2,3,4,5,6,7,8,9).

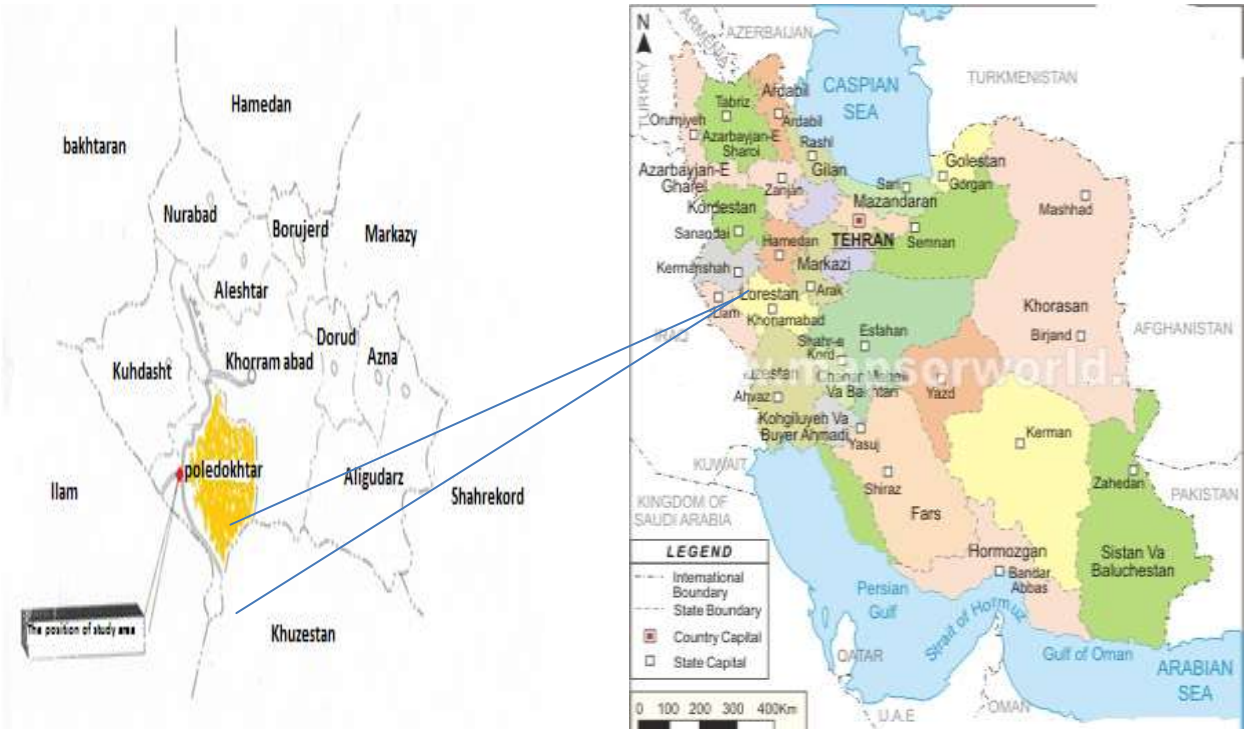

Figure 1: Geographical situation of jayder plain (poldokhtar)

Qualitative Assessment of Land Proportion for Special Plants (Classifying the Lands by the Use of FAO Method) (Sys et al., 1991a)

This method has some stages:

A: Gathering and processing the required data about the characteristics of the lands. In this stage, land characteristics are divided in to two groups, climate characteristics and land characteristics and for each group, the required information was gathered.

B. Determining the growth requirements

By the use of soil information that is gained through explaining the soil profiles and the studies that are done and comparing them with soil requirements of the products is presented as a number between 0 to 100.

C: Determining the qualitative classes and subclasses of the land proportion.

The last stage of qualitative assessment of land proportion growth requirements of the plant with climate and land condition and class and subclass determination Fn this research the parametric method is used (second root).

1) Determining the qualitative classes of land proportion.

Parametric Method

In this method a 0 to 100 gradation based on the characteristics of the land is specified.

For computing the proportion gradiation for each land climate characteristic, if the characteristic is sustainable and quantitative, the linear technique was used. And if the characteristic is qualitative, for example the class of soil texture, the average of the two gradations that the texture class in placed between them, was considered as the proportion gradation of that characteristic.

Climatic index was computed by use of the second root and finally was changed in to climatic rating by the help of one of these relations. From the second root relation, Land index was gained.

CI, LI = R$\sqrt{A/100 \times B/100 \times C/100..}$

CR= 16.67+0.9×CI if 25<CI<92.5

CR=1.6×CI if CI<25

In these relations:

It is the land index CR is climatic Rating, R min is the minimum rating gradation among all rating gradation and A,B,C, is the rating gradation.

By computing the land index, proportion class for each land was obtained.

2) Determining the qualitative classes of land rating the kind of limitations that take a land to one class, are the determiners of subclasses of land rating. Subclass is placed after the class symbols and they are showing with small latin letters that arechosen by contraction.

The Method of Estimating Biomass Net Production Rate (Bn) and Production Potential (Y)

In order to determine the production potential of rice in the mentioned area, the thermal- radiation production potential was used this model estimates the net production of the plant and also the operation of the production for the best variety in desirable.

Table 1: Rice production potential in Jaydar plain by FAO method

Amount	Computing the maximum net production of Biomass
39	Maximum leaf photo synthesis (Kilogram CH2O in hectare /hour)
413.87	Maximum gross production of Biomass in clear weather (kilogram / hectare during the day)
216	Maximum gross production of Biomass in cloudy Weather(kg/hectare during)
0.17	The ratio of days that the weather is not clear.
0.83	The ratio of days that the weather is not clear
550.37	The maximum net production of Biomass (kg CH2O/hectare/day time)
	Computing the met production rate of Biomass(Bn)
0.0108	Respiratory rate for all accept legume
0.01	Respiratory rate
120	The until number of day harvest
0.95	KLAI: correction factor
18820	Bn: Biomass net production rate
0.45	Harvest index
8469	Rice production potential (kg/hectare/dry matter)
9654	Rice Yield (kg/hectare)

Conditions from different aspects like, water, food, controlling the pests and diseases. For computing Biomass net production we use relation 1 (Sys *et al.*, 1997).

Bn=(0/36*bgm*KLAI)/ ((1/L) +0/25*ct)

In relation 1, Bn is the net production rate of Biomass (kg/hectare), ct is the respiratory rate that is gained from relation 2. Bgm is the maximum net production of Biomass (Kilogram CH2O in hectare in hour), KLAI is the correction factor for LAI <5m^2/m^2, L is the number of days required for production to be gained.

Ct= C30(0/044+0/0019t+0/001t^2)

C 30 is the respiratory rate that for plants except legume is 5% 108, T is the average temperature by C. Production is computed by relation 3.

Y= Bn*Hi

In relation 3, Y is production (kilogram / hectare) and Hi is harvest index.

Table 2: The results of qualitative land Evalution in different land units for rice

	Rice	
Land class	**Land index**	**Land unit**
N_{1t}	15.7	1:1
N_{1t}	15.5	1:2
N_{2t}	0	1:3
N_{1t}	15.1	2:1
N_{2t}	0	2:2
N_{2t}	0	2:3
N_{2t}	15	3:1
N_{2t}	0	3:2
N_{2t}	0	3:3
N_{1s}	21.5	4:1
N_{1s}	22	4:2
N_{1s}	23	4:3
N_{2t}	4	4:4
N_{2s}	2.6	5:1
N_{2s}	2.8	5:2
N_{2s}	1.6	5:3
N_{2st}	3.1	5:4
N_{2s}	2.9	5:5
S_{2t}	50.5	6:1
N_{1t}	16.5	6:2
N_{1t}	16.8	6:3
S_{2t}	54.7	7:1
S_{2t}	55.5	7:2
S_{3t}	42.7	7:3
S_{3t}	41.5	7:4
S_{2t}	53	7:5
S_{2t}	50.8	8:1
S_{3t}	44	8:2
S_{3n}	30.8	8:3
N_{2s}	2.7	9:1
N_{2s}	6.15	9:2
N_{2s}	3.8	9:3
N_{2s}	5.2	9:4

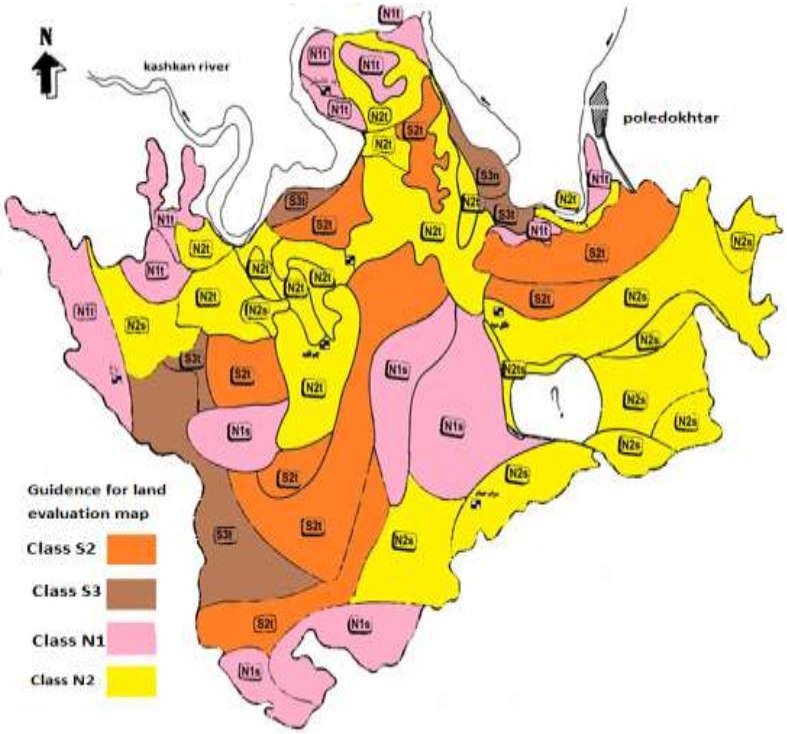

Figure 2: The map of jayder land rating for rice by the use of parametric method- second root

RESULTS AND DISCUSSION

In order to have a qualitative assessment first land assessment was done for rice. The land for rice was 86.6 by parametric method and it show that the land class is S_1. Totally, the results of the qualitative assessment show that for rice, the rating class is form S_2 to N_2 and the most limiting factors in these lands are land slope and the percentage of plaster subsequently. The results of this study show that 29.5 percent of them show crisis rating (S3), 27 percent show unsuitable rating (N1), 38.5 percent show unsuitable rating (N2). Climatic properties and soil properties show that cultivating some agricultural products is possible all the year. In other words, climatic properties create no limitation for producing rice.

It is recommended that assessment for land capacity should be done in order to use the resources in the best way, and some vital policies of agricultural section must be taken in order to increase the operation of important products, to stop excess import of rice and euit of. As table 1 show perationrate for rice in Jaydar without soil, water and management limitations, equals 9 tons and 654 kg, and considering the observed operation, in this area is 3 ton in hectare, it can be concluded that by having proper managements and the reparable limitation, we can have the 9ton and 654Kg-operation.

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