Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231-6345 (Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jls.htm
2014 Vol. 4 (1) January-March, pp.281-284/Sadikhani
Research Article

ESTIMATING THE RATE OF NET PRODUCTION OF BIOMASS (Bn) AND YIELD POTENTIAL (Y) FOR MAIZE IN KAMIN REGION, FARS PROVINCE, IRAN

***Mahmood Reza Sadikhani**
Soil Science Department, Faculty of Agriculture, Lorestan University, Iran
**Author for Correspondence*

ABSTRACT
Nowadays considering the importance of natural resources, especially soil for food security, management, planning and proper use of this valuable resource has become necessary. One of the most important and useful tools for optimum use of soil resources is ways to evaluate and determine the capability and capacity of land. One way is to estimate and optimize yield potential of the product in perfect condition. During the procedure, yield, regardless of any limitation, including limitation of water, soil and management are calculated. In this study, net production of biomass (Bn) and yield potential (Y) for Maize in Kamin region, SaadatShahr have been done. About region Kamin, SaadatShahr we can say The region of SaadatShahr with the area of approximately 14260 hectares is limited to About 80 km northeast of Shiraz between 52 degrees and 51 minutes to 53 degrees 13 minutes east longitude and 30 degrees north latitude 30 degrees 9 minutes north of the mountain gorge in the mountains and forests of East Arsanjan of south to the mountains of West Mount Sivand. The average height plain from sea level is 1770 meters. The results showed that the yield for maize in the Kamin region without soil, management and climate limitation is Equal to 8040kilograms DM in hectare ; In some areas of Kamin region the amount of harvested crop in the region are even less than the half in the study area.

Keywords: *Land Suitability Evaluation, Net Production of Bio-Mass, Potential Radiation - Heat, Maize*

INTRODUCTION
Land evaluation may be defined as the process of evaluating the role of land when it is used for a specific purpose. And it includes all methods that predict the potential ability of using lands. Land Evaluation determines the ground reaction toward specific productivity. With Land Evaluation, the relationship between land and its productivity is determined. Then, based on this relationship, its suitable usage can be found and the estimate of the amount necessary inputs and resulting outputs can be achieved. In today's world, due to the increasing population growth and urban development the possible expansion of the cultivated area is reduced and therefore a strong need for efficient use of available land will be felt. The main objective of land evaluation is that each land is used efficiently with the study of physical, social and economic aspects (Givi, 1988). The classification of land suitability is a review of natural resources such as water, air, soil, water and human, economic, social and agricultural resources (Sys *et al.,* 1991). The term land suitability evaluation was introduced for the first time in 1950 at the first International Congress of Soil Science, Amsterdam in an article entitled Assessment of future land development (Visser *et al.,* 1991). The years between 1950-1976, two important fundamental in the context of land evaluation took place in the world. The first was to divide the lands of America and the Soil Conservation Office, providing land within FAO's publication in 1976, which was introduced in the context of assessment for the purpose. Second, the land capability classification method provided by the office of Soil Conservation America and second, Provide the basis for the publication of the FAO in 1976, which is actually the basis for evaluating different objective introduced. The method until the 1975 aims to classify the various methods of assessment land, was being well covered in the world, but was unable to interpret the information in land development. So, FAO in 1976, edited and published foundation of land evaluation in the form Publication No. 32, Land evaluation studies in Iran, the first time in 1954, by an independent Board of Irrigation and Mahlr and other expert's collaboration with FAO was established.

These studies generally classified assessment and evaluation of resources and capabilities to irrigate the land. Evaluation officially was conducted by the Institute of Soil and Water Iran in 1968.
In 1970, recipe resource assessment and land capability (FAO Publication, 212) in the 766 Journal of Soil and Water Institute of Iran were released. Iran does not have a long history of land suitability for particular products. Some of these studies by Movahedi and Roozitalalb (1994) for crops in Iran, Sepahvand and Zarrinkafsh (1996) Khavh plain Lorestan, Ziayean and Abtahi (1996) in Dagenham-Fars, GhasemiDehkordi and Mahmoodi (1996) in Barkhar-Esfahan, Ayoobi and jalalian (1996) in barkhan-esfahan, Zareian and Baghernejad (1997) in beiza region, Fars province, Givi (1977,1988) in Falavarjan-Esfahan, Zeinodiny (1998) in Bard sir-Kerman, Sarvary and Mahmoodi (1998) in Ghazvin plain, Bazgir (1998) in Talandasht-Fars province and Sohrabi (2003) in Silakhoor plain have been done. Important work that has been done in this area was to prepare guidelines for land evaluation and horticultural crops by Givi in the year 1975 -1976 and has been published by the Research Institute for Soil and Water Country. In this collection, research crops of vegetative needs of Iran's most important crops in terms of climate and land characteristics, in the tables is done. Before calculating the required parameters for maize, it is better to know maize.
It has been considered a unique plant since the time that the indigenous peoples of the Americas developed it to be their staple food. It is central to many sacred mythologies and creation stories which are still honored today. Today, the United States, China, the European Union, Brazil and Mexico are the world's largest producers of maize. Together, the US and China produce approximately 60% of the world maize. 68% of the land devoted to maize is located in the developing world, however only 46% of maize production occurs there, indicating the need for improving yields in developing countries where it is a major source of direct human consumption for many of the poor. The United States is the world's largest producer and exporter of maize. Maize is the most important feed grain in the US because of its efficient conversion of dry substance to meat, milk and eggs, compared to other grains. In fact, the US devotes ~60% of its maize crop to animal feed. Approximately 20% is exported and the remaining crop is used for food and industry. There are 5 main endosperm types grown in the US: pop (<1% of commercial production), flint (14%), flour (12%), dent (73%), and sweet (<1%). Clearly, dent is the most important type, supplying livestock feed, starch, syrup, oil. The Maize Belt Dents of the US are only ~100-150 years old but they are the most productive races of maize in the world, providing the basic genetic foundation for virtually all of the maize produced in the US as well in most other temperate regions of the world. The maize plant is truly unique among the cereals. Maize is thought to be derived from teosinte, an ancient wild grass from Mexico and Guatemala. Unlike the other major cereal crops, there is physical separation of maize's male and female flowers. This allows for cross pollination and the large scale production of hybrid maize which is based on the exploitation of heterosis or hybrid vigor , broad morphological variation and genetic plasticity and diversity Maize is able to take advantage of sunlight better than most other major cereal crops and grows more rapidly because of the size and distribution of its foliage. It has high productivity due to its large leaf area and has one of the highest photosynthetic rates of all food crops. The high yield of maize compared to other cereal crops is possible because of the low position of the ear, where it is able to capture a greater proportion of the nutrients. This is unlike the other cereals whose seeds are found high up on the plant stalk. The ear is covered with a husk leaf, shielding the kernels from pests and accidental dispersal, unlike other cereals where individual grains are covered with bractea .Because of the husk leaves preventing the maize plant from dispersing its seed, some consider maize a human invention because it cannot reproduce without the aid of humans.

Research Objectives

The purpose of this study is to estimate net production of biomass and the resulting potential for maize in Kamin region, SaadatShahr Fars Province, Iran regardless of the limitations of soil, water and management to be aware of the capabilities of the lands and planning efforts in order to achieve maximum yield of maize in the study area.

MATERIALS AND METHODS

This study has been done for Kamin region, Fars province, Iran. About Kamin region, Sadatshahr we can say The region of SaadatShahr with the area of approximately 14260 hectares is limited to About 80 km northeast of Shiraz between 52 degrees and 51 minutes to 53 degrees 13 minutes east longitude and 30 degrees north latitude 30 degrees 9 minutes north of the mountain gorge in the mountains and forests of East arsanjan of south to the mountains of West Mount Sivand. The average height plain from sea level is 1770 meters.

In addition, some of the required information was extracted fromsynoptic station of Persepolis which located at 52 degrees and 54 minutes east longitude and 29 degrees and 56 minutes north latitude.In order to determine the potential production of Mize in the study area, potential of heat - radiation was used. In This model, net produces of living plant and yield for the best varieties favorable conditions in terms of water, food and the control of pests and diseases will be estimated.

Equation 1 is used to calculate the net biomass production [10].

Equation 1 - Bn= (0.36 *bgm*KLAI)/ ((1/L) +0.25*ct)

In equation 1 Bn is Net production of biomass (kilograms per hectare), ct is Respiratory rate, which is obtained from equation 2. Bgm is Maximum rate of impure biomass production (kg CH2O ha h^{-1}), KLAI correction factor for LAI < 5m2/m2 and L is Number of days required for product.

Equation 2- Ct=C30 $(0.044+0.0019t+0.001t^2)$

C30 is respiratory rate for non-legume plants equal to 0.0108. And t is mean temperature by Celsius. Product is obtained from equation 3.

Equation 3 - Y=Bn*HI

In Equation 3, Y is crop production (kg per hectare) and HI is the harvest index.

RESULTS AND DISCUSSIONS

The results of calculations performed to estimate the amount of net production and biomass production potential is given in Tables 1.

Table 1: The estimated coefficients of yield potential of Maize, Kamin region, FAO method

Calculate the maximum amount of impure biomass production (bgm)	**Amount**
Pm: Maximum leaf photosynthesis rate (kg CH2O ha^{-1} h^{-1})	64
bc: Maximum gross production of biomass in clear weather (kilograms per hectare per day)	381.2
Bo: Maximum gross production of biomass in cloudy weather (kilograms per hectare per day)	196.16
f: Ratio of days which the weather is not clear (1-n/N)	0.18
1-f: Ratio of days which the weather is clear (n/N)	0.82
Bgm = Maximum rate of impure biomass production (kg CH2O ha^{-1} h^{-1})	**707.75**
Calculation of net production of biomass (Bn)	
C30 : respiratory rate for non-legume plants	0.0094
Ct: Respiratory rate	0.135
L: Number of days required for product	135
KLAI: Correction factor	0.88
Bn: net production of biomass (kg ha^{-1})	22970
HN: Harvest index	0.35
Y: Production potential of Wheat (kg ha^{-1} D.M)	**8040**

Conclusions

As shown in Table 1, the yield for Maize in the KaminregionSaadartShahr without any limitations of soil, water and management, is 8040 kg DM in ha and the yield is 9406 kg in ha. The amount of harvested Maize are even less than the half in some area with the count of Maize grain humidity. Climate factors appear to be the most important factor for this yield. Management is undoubtedly one of the key strategies to achieve this yield. Overcome the limitations of soil and water are the keys to achieve the required potential yield. The calculated yield give a good insight to resolve the limitations and to adopt appropriate policies to improve and increase further yield.It is recommended to use better sufficiency of resources, assess the potential land us in all areas should be done. And important policies of Agricultural branch with regard to this ability so as to increase the yield of important andStrategic products to achieve self-sufficiency in the production of various crops to avoid excessive imports and the outflow of currency to be adopted.

The relation between three vertices of the triangle so as to achieve sustainable development in the agriculture, soil, Agricultural Extension and farmers are very necessary.it is very essential because if we use efficiency water and a proper management, not only we have a fertile soil in near future, but also we have better products both in quality and quantity.

REFERENCES

Ayoobi S and Jalalian (1996). Qualitative and quantitative land suitability evaluation for main crops in North Baraan Isfahan, MSc thesis, Soil Science, Faculty of Agriculture, University of Technology.

Bazgir M (1998). Identification and Classification of Soil and Land Suitability Assessment of quantity and quality of Kermanshah Talandsht area for wheat, barley, chickpea. Master's thesis, Discipline of Soil Science, Faculty of Agriculture, University of Isfahan Technology.

Ghasemidehkordi V and Mahmoudi S (1996). Evaluation of Land Suitability Barkhar region, Isfahan. *The fifth Congress of Soil Science, Iran.*

Givi G (1977). Land Suitability Evaluation for arable and horticultural crops. *Soil and Water Research Institute of Iran, Technical Bulletin No.10 15.*

Givi G (1988). Qualitative assessment, quantitative and economic suitability and production potential of land for major. *Planning and Agricultural Economics Research Institute* 351.

Movahedi Naeini S and Roozitalab A (1994). Evaluation of agricultural land suitability of products Gorgan, master's thesis, Department of Soil Science, Faculty of Agriculture, Tarbiat Modarres University.

Sarvary S and Mahmoodi (1998). Studies evaluating land suitability for irrigated crops in the Qazvin Plain, MA thesis, Department of Soil Science, Faculty of agriculture, Tehran University, Iran.

Sepahvand M and Zarrin Kafsh M (1996). Land suitability assessment for rainfed and irrigated plains KhavhNurabad, Abstracts Fifth Congress of Soil Science, Iran.

Sohrabi A (2003). Qualitative and Quantitive land suitability classification for sugar beet based on detailed soil survey in Lorestan Silakhoor plain (PhD thesis), Faculty of Agriculture, Tarbiat Modaress University.

Sys C, Van Ranst E and Debaveye J (1991). Land evaluation: (Part I-III) Principles in land evaluation and crop production calculation. General Administration for Development Cooperation. Agric. Pub. 1. No.7, Brussels, Belgium

Visser V, Vankelun CA, Worf J and Berkhout AA (1991). Land evaluation: from intuition to quantification. *Advances in Soil Sciences* edited by BA Stewart **15** 140 – 197

Zareian Gh and Baghernejad M (1997). The effect of topography on the evolution and diversity of soil clay minerals in Beyza- Fars province. *Journal of Soil and Water Sciences* **14**(1).

Zeinodiny Meymand A (1998). Soil studies and determine land suitability the Bardsir (Kerman) MSc thesis, Soil Science, Faculty of Agriculture, Tarbiat Modarres University.

Ziayean A and Abtahi A (1996). Land Suitability Evaluation Darnjan Plain, Fars Province, Iran. *The fifth Congress of Soil Science.*