



Annals of Agrarian Science

Journal homepage: <http://journals.org.ge/index.php>



Some aspects of agroecological assessment of soils on the development of economic conditions of the Lankaran lowland of Azerbaijan

L.J. Gasimov

Institute of Soil Science and Agrochemistry of ANAS 5, Mammad Arif Str., Baku, Az 1073, Republic of Azerbaijan

Received: 22 October 2018; accepted: 15 January 2019

ABSTRACT

Agroecologically evaluating of the soils under the perennial plantings (citrus and tea plantations) in the humid subtropic climate condition if the Lankaran Lowland has been performed. Unlike the traditional comparative evaluation, besides the soil parameters, the environment indices are also used. The main and open scales of the soils spread under the citrus and tea plantations have been built, the average calculation scores and comparative valuable coefficients have been found. A state of the perennial plantings (citrus and tea plantations) has been analyzed under the humid subtropic climate condition, decrease of the tea plantations area from 135000 hectares to 600 hectares has been indicated. Agroecologically evaluation of the soils under the perennial plantings was fulfilled. Unlike the traditional comparative assessment, The environment indices (rainfalls amount, M_d , $\Sigma T > 10^\circ C$, BIP) beside the soil indications (humus, Ph, > 0.25 mm aggregates quantity, bulky weight) are used. At this time the correction coefficients of pseudopodzol which is character for the zone are used: weak pseudopodzolic-1.0; mean pseudopodzolic-0.80; strong pseudopodzolic-0.60; The agroecological scores of the soils under the perennial plantings (citrus and tea plantations) in the humid subtropical climate condition got the following values: weak pseudopodzalic yellow-forest-96 scores; mean pseudopodzalic yellow-forest -77 scores; weak pseudopodzalic yellow-95 scores, mean pseudopodzalic yellow-75 scores; strong pseudopodzalic yellow-58 scores; pseudopodzalic yellow-gleyey-93 scores; yellow-gleyey-91 scores; dark yellow meadow-100 scores; ordinary yellow-meadow-66 scores, bright yellow-meadow 56 scores.

Keywords: Soil, Parameters, Citrus and Tea plantation, Agroecological factors. Environment, Perennial planting.

*Corresponding author: G. Gasimov; E-mail address: l.gasimov@gmail.com

Introduction

Now are some important aspects of the ecological valuation of the soils under the perennial plantings (citrus and tea plantations) in the humid subtropics climate condition. Thereby a role of the natural and anthropogenic factors which participate in soil cover formation of the Lankaran Lowland differs from the other regions of the republic.

The climate condition possesses more influence and the climate factors actively participate in soils genesis.

A superiority of the teaching regime is observed in most cases in the center and south of the Lankaran Low Land.

The motley landscapes formation, soil cover

variety, soil formation of the various facial zones are reflected [1]. A variety of the soil cover and climate condition shows itself in a character of the soil resources use and structural system of the farming lands.

A central and southern part of the Low Land is very good for citrus-growing and tea-growing development. Therefore agro ecologically evaluating of soils under the citrus and tea plantations in the humid subtropics condition assumes scientific-theoretical and practical importance.

On the basis of our investigations a total area of the soils concerning the humid subtropics soil formation is 32214,8 hectares in the plain part of the Lankaran Lowland.

Objectives and methods

The Lankaran Lowland is situated on the Caspian Sea shore of the east part of the Lankaran province. A geological structure in the research object is characterized by the deposit rocks collection in the zone. The Lankaran Low Land is entered the humid subtropics climate zone which is conditioned by little rainy summer and mild winter. An amount of the yearly rainfalls is 1200-1700mm in the research object. An annual average temperature changes by 14,6-15,0°C. all the rives which get a source from Talish, Peshtasar, Burovar mountains runs into the Caspian Sea. A composition of the perennial planting possess a special structure. This region is known with its tea plantations and subtropics

While the soils under citrus and tea are agro ecologically evaluated, the researches have been performed at three stages: cameral-preparation, field-laboratorial, summarizing-cameral. The methods and approaches have been used according to each stage.

Results and analysis

There is a need for an assessment in any area of the human's activity. Ther soils assessment is a great conception. Some researches were devoted to the evaluation of the soils under the annual plantings, including citrus and tea plantations in the moisture subtropics from a different point of view [2-12].

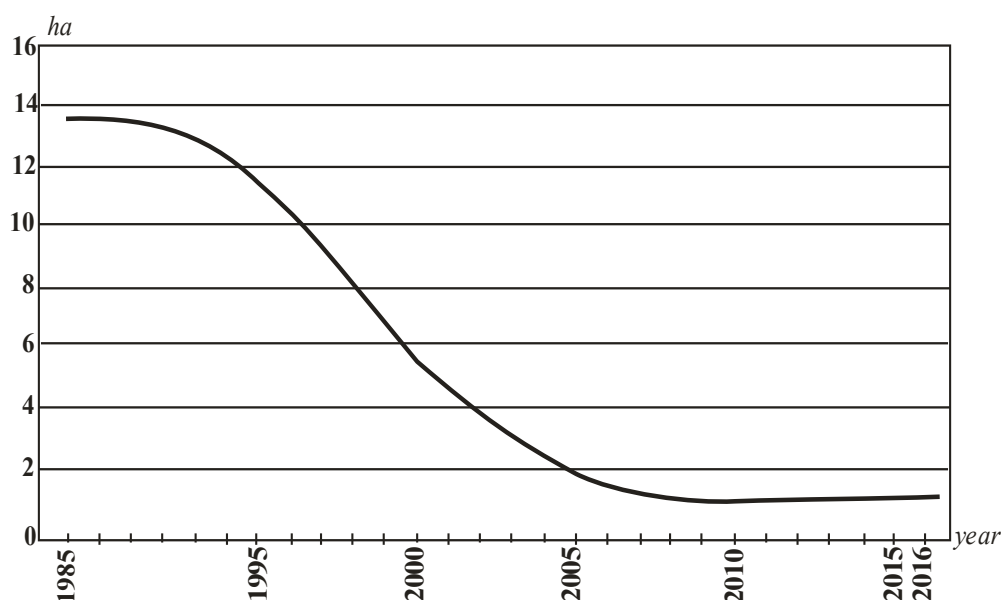


Fig. Perennial dynamics of the farming lands under the tea-plantations in the Lankaran Lowland (1985-2016).

fruit gardens. But it's very pity, from the end of the 80th years of the XX century and in the first years of our independence some farming actions in the Low Land, inducing the tea-growing fell into decay. So, the tea plantations area descended from 13.4000 hectares in 1985 to 600 hectares in 2010. But last years there are some progresses in this area. Thereby the areas under the plantations reached 1000 hectares in 2016. This tendency is going on.

But wholly different approach was suggested by S.Z. Mammadova [3] in the 90th years of the last century, while performing an ecological assessment of the soils under tea plant.

According to this approach not only the soil but also the environment factors (height of the zone, rainfalls, inclination, a sum of the positive temperatures and etc), are taken as a criterion while ecologically evaluating the soils under agroecosystems. [13-15]. It is known, that a

role of the climate and soil factors is great in subtropic plants development (citrus and tea) of the Lankaran Low Land. The agro ecological scores are found for the environment and soil parameters of the soils under the same plants considering this feature of the zone. At this time S. Z. Mammadova's [3] method which was modified by us has been used. There by the agro ecological assessment of the soils under the subtropics perennial plants in the moisture subtropics climate condition was realized by the following sequence:

At the first stage-the environment (rainfalls, M_d , $\Sigma > 10^\circ C$, BIP) and soil (humus, pH, water-resistant aggregates, bulky weight) factors have been used, the agroecological scores of the soils are found) and the main agroecological scales are built, at the second stage-the total agroecological scores are found and an open agroecological scale was built by an application of the correction coefficients (Table).

As a result of the calculations it was known that a value index of the facial group of the psevdopodzolic yellow-forest and podzolic yellow-gleyey soil formation used under tea and citrus plant was 95 scores.

It unprovided with the heat and humidity to a high degree of zone where the same facial group spreads.

It was so, because the zone with the same facial groups aren't provided with the heat and humidity to a high degree. An agroecological score of the environment parameters changed by 91-100 scores here. An average index was 88 scores on facial group. There are some factors

besides eight environment and soil factors during formation of the agroecological scores in soil with facial group, they are taken into account by the correction coefficients as they show themselves in the local zones. The soil irrigation, granulometric structure, (psevd) podzolic, erision and other characters include in here. But sometimes the psevdopodzolic rate participates as a factor which limits fertility under the moisture subtropics condition. This factor was considered by the correction coefficients: psevdopodzolic to a weak degree – 1,0; psevdopodzolic to an average degree – 0,80; psevdopodzolic to a strong degree – 0,60. The following mathematic formula was used to build a scale of the total bonitet scores:

$$B = B_{\text{я}} \cdot \text{Я}_{\text{ssn}} \cdot \text{Я}_{\text{sk}}$$

B – a total bonitet score of soil:

B_2 – a bonitet score taken from the basic bonitet scale in soil.

So, an open scale of the agroecological scores of the soils under citrus and tea plant in the humid subtropics was compiled by using from the correction coefficients (Table).

It was connected with unproviding of the zone with the same facial group.

As is seen from (Table) an average calculation score of the soils under citrus and tea plant in the moisture subtropic condition of the Lankaran Lowland after the correction coefficients application was 81 scores. A map at a scale of 1:100000 in agroecological evaluation of Lankaran soils was composed on the basis of our consequences.

Table. *Open agroecological value scale of the soils under citrus and tea plant in the Lankaran Lowland*

Name of soils	Agroecological scores of the soils	Area, hectares	Comparative valuable coefficient
Weak psevdopodzolic yellow-forest	96	534,3	1,09
Average psevdopodzolic yellow-forest	77	2728,9	0,88
Weak psevdopodzolic- yellow	95	14466,0	1,09
Average psevdopodzolic yellow	75	6936,8	0,88
Strong psevdopodzolic yellow	58	1315,1	0,65
Psevdopodzolic yellow-gleyey	93	2093,0	1,07
Yellow-gleyey	91	485,4	1,03
Dark-yellow-meadow	10	1217,7	1,14
Ordinary yellow-meadow	66	1415,6	0,75
Bright yellow-meadow	56	1022,0	0,66
Average calculation score on moisture subtropics	81	32214,8	1,00

Conclusion

The following approach was used during an agro ecological assessment of the soils under citrus and tea plants in the Lankaran humid subtropics condition: at the first stage – the environment (rainfalls, M_d , $\Sigma T > 10^\circ C$, BIP) and soil (humus, pH, $> 0,25mm$, bulky weight) factors are used, basic agro ecological scores on soils facial groups are used and a main agro ecological scale is built, at the second stage- agro ecological scores of the soils in soil forming facial groups are found by the correction coefficients application and an open) agro ecological scale is built.

The agro ecological scores of the soils under citrus and tea plants after the correction coefficients got as the following values: weak psevdopodzolic yellow-forest – 96 scores; mean psevdopodzolic yellow-forest – 77 scores; weak psevdopodzolic yellow-forest – 95; average psevdopodzolic yellow- 75 scores; strong psevdopodzolic yellow - 58 scores; psevdopodzolic yellow - gleyey – 93 scores; yellow - gleyey – 91 scores; dark yellow – meadow – 100 scores; ordinary yellow meadow – 66 scores; bright yellow - meadow – 56 scores.

References

- [1] Witkam M. Soils as components of ecosystems, Annual Review of Ecology and Systematics, 2 (1971) 85-110.
- [2] Mammadov G.Sh., Jafarov A.B., Prujlu A.S., Soils Bonitation, Elm, Baku, 2015 (in Azeri).
- [3] Mammadov G.Sh., Ecological Evaluation of Azerbaijan Soils. Baku, Elm, Baku, 1998 (in Azeri).
- [4] Mammadova S.Z. Agroecologically assessment of the agricultural plant soils in Lankaran, Complete works of the international scientific symposium devoted to 75 anniversary of the Azerbaijan Agriculture Academy, vol 1, Baku – Ganja, 2004, pp. 313-327 (in Azeri).
- [5] Jafarov A.B., Yusifov M.A., Suleymanov N.A., Bonitation conception of the little farming lands, Works of the Azerbaijan Sol Scientists Society, vol. VIII, Baku, 2001, pp. 133-134 (in Azeri).
- [6] Ahadov D.R. Agroecological Peculiarities and Bonitation of Soils Good for Tea in the Moisture Subtropics of the Southern Part from Lankaran, Synop. of thesis diss. cand. agr. sci., Baku, 1979 (in Azeri).
- [7] Baliev A.G., Agroecological Peculiarities and Bonitation of Soils in Lankaran Agroecosis and Rational Use, Synop. of thesis. diss. cand. agr. sci., Baku, 1981 (in Azeri).
- [8] Hasanov Sh.G., Natural – Genetic Peculiarities and Bonitation of Soils in the South - Western Azerbaijan, Elm, Baku, 1972 (in Azeri).
- [9] Mammadov G. Sh., Veliev A.G., Soil Bonitation in the Moisture Subtropics of Azerbaijan, News series of biological sciences in AS Azerb. SSR, 5, Baku (1979) 59-61 (in Azeri).
- [10] Mammadov G.Sh., Ecological Value of Soils in the Agricultural and Forest Lands of Azerbaijan. Synop. of thesis.diss. doct. biol. sci., Dnepropetrovsk, 1991.
- [11] Eyyubov A.A., Climate Bonitation of Azerbaijan SSR, Baku, 1975 (in Azeri).
- [12] Mammadov S.Z., Methodical problems on soil value in the agricultural and forest lands of Azerbaijan, Mat. inter. sci. conf. “Ecology, biology of soils”, 2005. Rostov – Don, 200, pp. 293-296.
- [13] Mammadova S.Z., Soil Resources and Bonitation of the Lankaran Province, Elm, Baku, 2003 (in Azeri).
- [14] Eskert H. h/ip. Criteria and standarts for sustainable agriculture/ Eskert H. Breitshuh G., Sautrbck D. // J. Plant Nutrit. Soil Se.2000.vol.163, № 4, P.337-351
- [15] IUSS Working Group WRB. World Reference Base for Soil Resources 2014. International soil classification system for naming soil and creating legends for soil maps. World Soil Recourses Reports, №.106 FAO, Rome, 2014.