Agroecological importance of the tea plantation fertilization on the eroded slopes in the south-eastern part of Lankaran

Akbarova Ulkar Zakir Gizi

1 D.of Philosophy on agrarian sciences, associate professor of the Department of Veterinary and Agrarian Sciences; Lankaran State University; Republic of Azerbaijan

Abstract.
In this article the eroded state of the Lankaran soil was determined, recommendations against erosion were given, an influence of fertilizer on productivity was studied. The Lankaran province is one of the main agrarian regions of the Azerbaijan Republic. There are a good agroclimate and soil reserves for agriculture development, here. There are great perspectives for development of tea, paddy, citrus and subtropic plant-growing. As a result of irrational use of soil in the farmer farms the soil fertility is getting worse every year. So, not applying the correct agrotechnical rules accelerated the erosion process in the soil. All these create a great necessity to study erosion process, to analyze its impact on productivity.

Keywords:
The Lankaran province
pseudopodzolic-yellow soil
erosion
tea plant
fertilization
INTRODUCTION. Rational use problem of natural reserves and especially soil resource is one of the most important problems in order to provide an agroecological development of its various fields. It is known that today the whole world is facing the problem of food security and availability of environmentally clean agriculture. Especially, in the last 50 years, exhaustion of arable land resources occurred as a result of rapid natural growth of the population, increase of their need for food products, construction of new residential areas, an anthropogenic activity impact and other factors. So, the soil reserves gradually lose an ability of meeting the population’s need for food. The people’s spontaneous intervention in the environment leads to soil cover degradation which is natural landscape complexes and its one component.

Despite all these, rational use of the soil fund, protection it from erosion assume a great importance.

MATERIAL AND METHODS. The research aim is to evaluate an impact of fertilizer on ecological fertility parameters of eroded soil under tea and to apply a model of the great agrochemical ecological fertility to production in the obtained variant. The research was performed in the Fruit and Tea Cultivation Scientific Research Institute (in the planted tea plantations) in the Lankaran Tea branch in 2019-2021. The eroded degree was determined on the basis of destruction of the genetic layers (S.S.Sobolev and K.A.Alekerov). The thematic and climate maps (cartographic-statistical), hydrogeological researches, biogeographical (geographical information systems) information were widely used in order to get thorough information about the zone where the research will be carried out. Besides, the monitoring method was used to control the state of soil and plants, its regulation. The experiment was performed with the following scheme on “Local population” sort of the tea plant in 3 repetitions under 5 variants: 1) nonfertilizer (control); 2) N90P90K90; 3) N90P90K90 +20 t/h of compost; 4) N120P120K90; 5) N120P120K90+30 t/h of compost.

Tea-growing occupies a very important place in economy of the Lankaran-Astara region. The researches performed in 1980 indicated that the soil area suitable for tea with various degree was more than 25 000 hectares. 13280 hectares of them
were under the tea plantations in the former Soviet times. More of these plantations were out of order during the known events in the country. The tea plantations in the zone were planted and they are being planted on the foothill slopes. An area and productivity of this valuable plant can be increased in the humid subtropic Lankaran province which possesses a good soil-climate condition for tea plant. But the erosion process strongly deteriorate water-physical, agrochemical and biological characters of soil, productivity reduced in the tea plantations.

We should note that a role of the tea bushes is great in protection of slope soil from erosion. Because, the tea bushes create a balloon parasol, cover the soil surface, protect it from the destructive impact of rain and snow water and don’t permit creation of the erosion process [1]. On the other hand, this reason is formation of the erosion process, development, spreading and intensity and planting the rows of the tea bushes in the longitudinal direction of the slope.

Due to the lack of soil protection agroecological measures in the plantations, the rows of which are laid along the slope, the heavy downpours do not meet any resistance and form a surface flow, washing away the soil. As a result a normal nutrient regime of plants destroys, the development weakens, productivity reduces and crop quality becomes worse. Such states are vivid in the irrigated foothill soil.

So, the researches in the Lankaran province indicate that if humus supply was 357 t/ha in one-metre soil layer of mountain-brown soil 40-50 years ago, at present this index reduced 26% and became 260 t/ha [6].

It should be noted that some researchers investigated erosion process in the soil of the Lankaran region [2, 3, 5]. These researches sowed that 32% of the investigated zone was eroded before, but now this index rises 10%, and it is 42%.

The researches indicated that pseudopodzolic-yellow soil of the Lankaran ecological region spread at an altitude of 100-200m to 700m above sea in the low mountain and south foothill zone. This soil is formed in the humid climatic zone. A quantity of the average annual temperature is till 14° C, but an amount of the average annual precipitations is from 700 mm (in the north of the zone) to 1400-1800 mm (in the south, in the zone of Astara). Most of the precipitations are
heavy shower. Here, although torrential rains are the main reason of floods, the diversity, geomorphological and geological structure of the relief are factors which influence creation of the erosion kinds and floodplains. The landslides expand in the river basins in connection with the lithological and hydrological factors. Fluvial relief forms are also main relief forms which are characteristic for the investigated zone. The river-beds of dry rivers, debris cones, deltas, other erosion and accumulative origin relief forms belong to this relief kind. The anthropogen (technogen) relief forms are formed as a result of construction of irrigation and drainage systems in amelioration. The soil is infertile and unfit for agriculture in the places with denudation relief forms. The monitoring experiments have been applied in the tea-soil that was eroded to a different degree in the farmer farms of the humid subtropic region of Lankaran selected as an object in order to form a complex system of technical innovation-oriented measures with the purpose of mastering a new farming system.

It is known that a quantity of the nutrients is less for the plants in the eroded soil. Therefore application of organic and mineral fertilizer in this soil is of great importance. Because the plants quickly grow and become dense, form a dense root system in the fertilized soil. The bushes develop in the tea plantations and cover the soil as evergreen pall, protect it from destructive impact of rain and snow water.

It can be noted that the problems which are shown in the eroded soil areas were poorly studied while performing the thorough scientific works about application of fertilizer to non-eroded soil and study of the nutrition regime of plants [4].

The long researches show that more than 4500 hectares of the tea-soil have been eroded to various degree. Therefore we begin to apply and conduct field and production experiments of compost mineral fertilizer with organic fertilizer sorts in Lankaran in order to increase fertility of the soil in which these plants are grown and to grow the qualitative indications of product. Our duties are the followings:

1) To investigate an agrochemical character of the soil area where the experiment is carried out;
2) Impact of fertilizer on dynamics of nutrients in the washed pseudopodzolic-yellow soil;
3) Influence of fertilizer norms on plant development;
4) Effect of fertilizer on the quantity of nutrients in one-year stem of the tea plant;
5) Impact of fertilizer on productivity of the tea leaf.

The soil samples have been taken from the area by the convert method before the fertilizer isn’t applied in order to study agrochemical character of the soil in the experiment area (0-20, 20-40, 40-60, 80-100 m of layer) and a total quantity of the nutrients and absorbing forms have been determined. The fertilization system was worked out for increase of product of the green tea leaf based on the study of dynamics over development stages of the plants and the results of the gross form analyses of the nutrients in the soil.

Therefore, densing of the interrow leaves (branch) over the variants and an influence of different norms and ratios of the fertilizer on collection dynamics of the nutrient in the stages of the harvesting have been studied. The soil samples were taken from 0-20, 20-40 cm of layers, ammoniac and nitrate forms of nitrogen, a quantity of exchangeable potassium and gross phosphorus were determined in them. The permanent flow pitches have been chosen in the tea plantations of the Khanbulan and Hirkan farmer farms in order to study change of the quantity of the washed soil and surface water flow created as a result of natural precipitations depending on inclination and length and the iron barrels with the sizes of 75×75×75 cm have been buried at the end of the rows laid out in the longitudinal direction of the slope. The observations indicate that the relief and direction of the slope influence the biochemical flow of the substances. Formation, development, expanding and intensity of erosion process in the tea plantations are inextricably linked to the direction of the tea bushes on the slope. Our long researches show that though as a result of the natural precipitations leaching of the soil from the rows of the tea plantations which were built in the width direction of the slope wasn’t observed, the length of the slope was 15m, inclination was 8-10°, the surface water flow was 240m³/ha, an amount of the
leaching soil was 28 t/ha in the tea plantations which were constructed in the length direction of the slope during the year.

Application of the fertilizer to slopes has a positive influence on weakening of soil erosion and increase of productivity of the green tea leaf. Application of fertilizer to the leached soil is useful in two aspects. On the one hand, plants prevent erosion by forming a strong root system and compacting in the fertilized soil and on the other hand it causes increase of plant productivity and ecological quality of the product (table1).

<table>
<thead>
<tr>
<th>№</th>
<th>Variants</th>
<th>Crop, per hectare, kg</th>
<th>Increase, kg-from hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Non-fertilizer (control)</td>
<td>1100</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>N90P90K90</td>
<td>2200</td>
<td>1100</td>
</tr>
<tr>
<td>3.</td>
<td>Compost 20 t/h +N90P90K90</td>
<td>2450</td>
<td>1350</td>
</tr>
<tr>
<td>4.</td>
<td>N120P120K90</td>
<td>2680</td>
<td>1580</td>
</tr>
<tr>
<td>5.</td>
<td>N120P120K90+30 t/h of compost</td>
<td>2810</td>
<td>1710</td>
</tr>
</tbody>
</table>

As it is seen from the table, together application of mineral and organic fertilizer is very useful in the eroded pseudopodzolic-yellow soil. Though product on of mineral fertilizer increases, organic fertilizers—compost, siderates, manure don’t loss their importance, on the contrary while rationally using of the organic fertilizers, the effectiveness, economic ecological profit of mineral fertilizer become higher. It was determined that while applying 30 t of compost with mineral fertilizer (N120P120K90+30 t/h of compost), the product increase —green tea leaf 1710 kg/ha higher compared to control variant. Being of crop quantity with its quality is of great importance. A quality of the green tea leaf was higher (tannin and extractive) in the variant with 30 t of compost N120P120K90.

**CONCLUSION.** The special measures (contour-ameliorative, terracing and so on) must be used for construction of the new tea plantations on the slopes with the inclination more than 16° in the eroded tea plantations.
The systems of the field protective rotation must be preferred in the tea plantations, mineral and organic fertilizers should be applied to the ploughed fields in an optimal norm.

Plough cultivation work on the slopes must be performed in the width direction of the slope or on horizons of the area, the blocs and furrows must be formed in order to reduce leaching and to keep humidity.

The special mountain contours or the balance sheets should be used. Plough must be begun from the low part of the slope, the layers must be converted to the low side of the slope.

The positive balance of the nutrient must be formed in the soil by applying mineral fertilizers together with organic fertilizer in the eroded soil.

While applying a fertilizing system for tea sowing areas in the eroded podzolic-yellow soil, a dose, application time and methods of mineral fertilizers should be determined correctly.

Fertilizing must be applied to the tea plantations in the eroded soil before plough, at plough time and after plough. So, application of organic-mineral fertilizer system with the other agrotechnical and biological methods, increase of the soil fertility, productivity of the green tea leaf, quality improvement and minimization of the negative impact on environment are reliable basis.

Increase of the green tea crop, application of the progressive scientific innovative technologies must be provided by using of biological and amelioration methods. The most important of these systems is biological system of agriculture. It is possible to get a high qualitative crop of the plant-growing as a result of application of new scientific innovative technologies of the biological and agronomic methods.

References:


GEOLOGY, MINERALOGY AND SOIL SCIENCE


