

THE IMPORTANCE OF AGRO-PRODUCTION SOIL GROUPS IN THE PREPARATION AND IMPLEMENTATION OF AGRICULTURAL LAND CONSOLIDATION PROJECTS

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Abstract

The article examined the quality of the soils of agricultural lands in the country after the land reform. It was found that the lack of clear criteria for combining soil varieties contributed to their arbitrary unification in agrogroups. Such unification of soil varieties was used when allocating land shares in the country, which led to negative consequences when using these lands. Given that there is currently an urgent need to consolidate land shares, the authors in the article indicate the need to develop a new approach to combining soil varieties. Unification of soil varieties according to new criteria will help relevant specialists, in a scientifically sound form, to carry out a merger, equivalent exchange and other actions on a land plot during the preparation and implementation of land consolidation projects.

Keywords: Agro-grouping of soils, land consolidation, soil, land resources, land fragmentation, land share, agricultural land.

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Introduction:

The soil cover of Azerbaijan, depending on the natural zones and soil formation conditions, is very diverse and, depending on this, various types, subtypes and kinds of soils were formed on the territory of the country (see Fig. 1). In the soil cover of all natural zones of Azerbaijan, the upper fertile soil layer has been severely degraded for various reasons. Agricultural lands allocated in the form of land shares during the first land reform carried out in the country were mainly subject to such degradation. As a result of such degradation of the soil cover, large areas of agricultural land have to be completely or partially withdrawn from circulation. We have established the main reasons for the decrease in soil fertility and the deterioration of the soil cover in the territories of land shares. As we were able to establish, these reasons were associated with improper combination of soil varieties when allocating land shares, excessive fragmentation of land massifs, small sizes of land shares, as well

as with land plot configurations that are inconvenient for processing [8]. In connection with the current situation with the soil cover of agricultural lands of the country, there is a need to develop methods on the basis of which measures will be developed to protect soil fertility, relying on ecological and economic laws [6, 1, 10, 11, 14]. For this, we believe that first of all it is necessary to carry out agro-industrial grouping of soils, based on newly developed criteria. Carrying out grouping of soils on the basis of newly developed criteria in the future will help in scientifically sound preparation of projects for consolidation of land shares in the country, and this in turn will help in the formation of such a land use system that would ensure economically efficient and environmentally safe use of agricultural lands of the country.

Object and methods of research.

The objects of research are the soil cover of agricultural lands allocated in the form of land shares to rural residents before the land reform in the country. The method of carrying out work in the agro-grouping of soils mainly consisted in the proximity or difference of the genetic properties of soils and natural conditions that have a certain effect on soil fertility. For this, the following methods of soil research were mainly used: mechanical analysis; chemical analysis and agrochemical analysis.

Soil Map of Azerbaijan

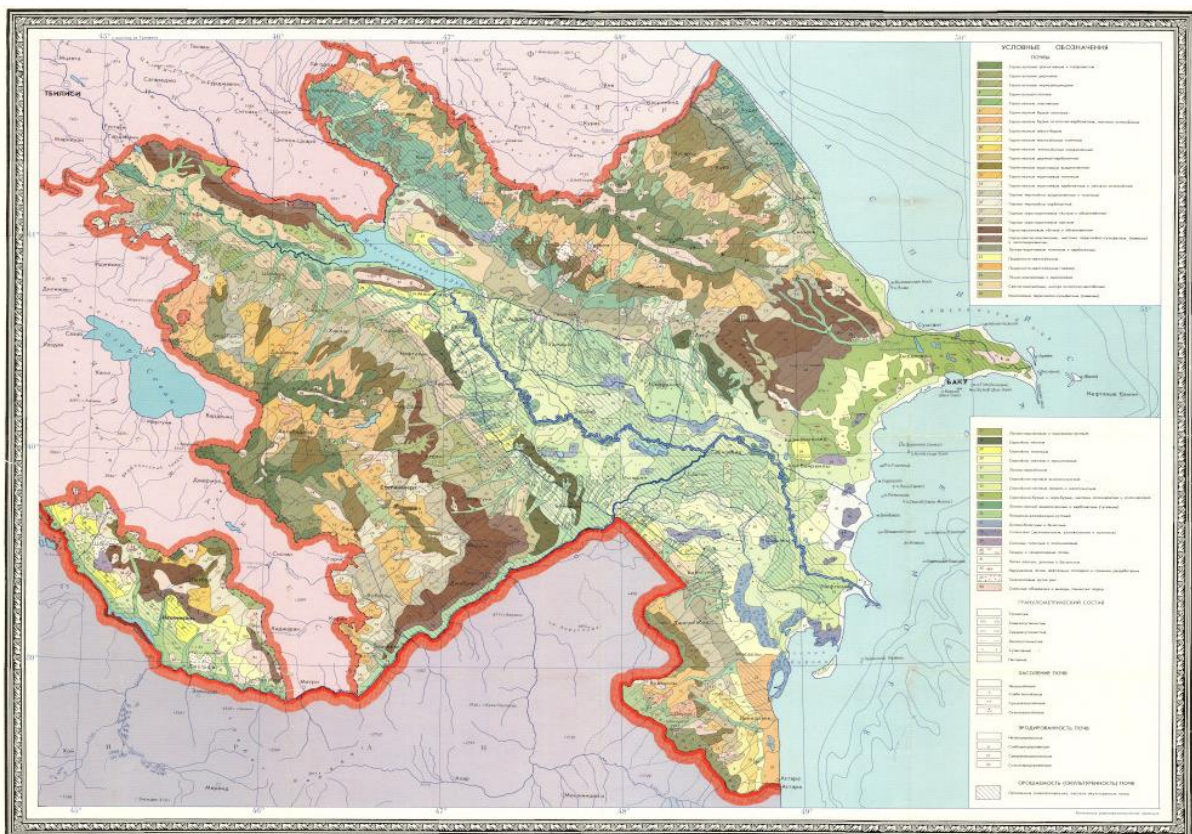


Fig. 1. Soil map of Azerbaijan

Discussion and results:

Rational use of soils for different agricultural crops and increasing their productivity are closely related to the consideration of anthropogenic factors. Many authors have studied the influence of anthropogenic factors on soil fertility and quality rating at one time - I.D. Dalyatshin, R.I. Luneva, L.I. Ryabinina, G.Sh. Mamedov, etc.

An analysis of the works on agro-industrial grouping of soils completed to date in Azerbaijan shows that their construction mainly took into account the proximity or difference in the genetic properties of soils and natural conditions that have a decisive influence on soil fertility. Agro-grouping of soils in the country is carried out in three types in accordance with: the requirements of individual agricultural crops; the requirements of certain ecological groups of agricultural crops or types of land use; general groupings built without taking into account any specific crops, which are based on the properties of soils that determine their quality as an environment for cultivated plants. The lack of clear criteria for combining soil varieties in the country contributed to the arbitrary unification of soil varieties in agrogroups. In our opinion, such an approach does not reflect the true state of affairs, since there are no clear criteria for combining soil varieties. For example, in Azerbaijan, where ordinary gray soils, slightly saline gray soils and highly saline gray soils are common under forage lands, the soils received 100, 87, 63 and 25 points, respectively. How can they be combined into one group when they are included in different groups and there are separate recommendations for them that make it possible to determine the correctness of their actual use by the farm, plan production, its placement and specialization.

With the development of scientific research, the soil appraisal and their unification into agro-production groups became more specific and precise, since the groups included soils with the corresponding bonitet points. Such grouping takes into account the nature of soil fertility and the attitude to the main agrotechnical measures. The soil bonitet points identified by fertility indicators during grouping come, first of all, from the genetic similarity of soil varieties as a very important general indicator of their agro-production value. When identifying the bonitet point, we took into account the soil cultivation as an indicator of effective and potential fertility, climate in the form of bioclimatic potential (BCP), granulometric composition, determining the water-air and technical properties of soils, their salinity and erudition.

The agro-industrial grouping of soils, compiled on the basis of indicators characterizing soil fertility, is, in our opinion, clear, correct, and more acceptable in agriculture. Such a grouping of soils will serve for the rational use of lands and their high-quality accounting [6].

As is known, the main indicators of soil fertility expression are its grading score or, in other words, the bonitet score. According to the soil grading score, lands are divided into five groups according to their suitability for use. Academician G.Sh. Mamedov at different times (1985, 1991, 1998) based on the grading scale (Table 1) compiled a qualitative grouping of lands and here the soils were grouped into five agro-production groups.

Table 1. Agro-industrial grouping of soils of Azerbaijan

| Land quality groups | Soils included in the groups | Points | Square | |
|--|---|--------------------------|-----------|----------------|
| | | | ha | % |
| 1 | 2 | 3 | 4 | 5 |
| I group of high-quality soil 100-81 points | Mountain leached chernozems | 100 | 14400 | 0,17 |
| | Mountain cultivated chernozems | 100 | 19170 | 0,22 |
| | Mountain meadow peaty | 95 | 27370 | 0,32 |
| | Yellow earth podzolic gley | 94 | 57440 | 0,66 |
| | Mountain meadow chernozem-like | 90 | 63570 | 0,74 |
| | Mountain forest brown cultivated | 90 | 61140 | 0,71 |
| | Mountain meadow turf | 89 | 218440 | 2,53 |
| | Mountain forest brown steppe | 88 | 19170 | 0,22 |
| | Mountain forest brown typical | 87 | 37720 | 0,44 |
| | Mountain forest turf-carbonate | 87 | 9000 | 0,10 |
| | Mountain forest brown carbonate | 87 | 61410 | 0,75 |
| | Mountain forest meadow | 86 | 54920 | 0,64 |
| | Mountain carbonate chernozems | 86 | 8100 | 0,09 |
| | Mountain typical chernozems | 85 | 3187031 | 0,37 |
| | Mountain forest brown typical | 85 | 0970 | 3,60 |
| | Meadow brown | 85 | 432150 | 5,00 |
| | Mountain forest brown leached | 84 | 235260 | 2,72 |
| | Chestnut dark | 84 | 57710 | 0,67 |
| | Sierozem dark | 82 | 93980 | 1,09 |
| | | Average by groups | 86 | 1814790 |
| II group good lands 80-61 points | Mountain forest brown loess | 80 | 291160 | 3,37 |
| | Common chestnut | 80 | 437550 | 5,06 |
| | Mountain forest yellow earth podzolized | 79 | 34570 | 0,40 |
| | Meadow-gray earth (groundwater level 1.5-3 m) | 79 | 126950 | 1,47 |
| | Yellow earth-podzolic | 78 | 28170 | 0,33 |
| | Chestnut long irrigated | 77 | 368840 | 4,27 |
| | Mountain forest-brown residual-carbonate | 76 | 4500 | 0,05 |
| | Floodplain-meadow-forest leached | 75 | 234440 | 2,71 |
| | Meadow-chestnut long irrigated | 74 | 9900 | 0,11 |
| | Mountain meadow-steppe | 72 | 74640 | 0,86 |
| | Meadow-marsh (including floodplain) leached | 71 | 87660 | 1,01 |
| | Meadow-marsh (including floodplain) marled | | | |
| | Mountain meadow residual-carbonate | 71 | 22770 | 0,26 |
| | Irrigated meadow-gray earth (groundwater level 1.5-3 m) | 70 | 24300 | 0,28 |
| | Floodplain-meadow-forest carbonate | | 532920 | 6,17 |
| | Mountain forest brown steppe | 70 | 32410 | 0,38 |
| | Mountain gray-brown dark | 69 | 100850 | 1,17 |
| | Mountain-forest-yellow earth typical | 69 | 148850 | 1,72 |
| | Meadow-gray soil (GWL 3-6) | 68 | 36910 | 0,43 |

| | | | | |
|---|--|--------------|----------------|----------------|
| | Irrigated meadow-gray soil (GWL 3-6) | 68 | 491840 | 5,69 |
| | Meadow-marsh (floodplain) leached | 68 | 159510 | 1,85 |
| | Typical gray soils | 67 | 1800 | 0,02 |
| | Irrigated gray soils | 66 | 331430 | 3,84 |
| | Mountain-chestnut dark | 66 | 380310 | 4,40 |
| | Mountain-gray-brown ordinary | 65 | 27740 | 0,32 |
| | Floodplain-meadow (alluvial-meadow) | 63 | 189990 | 2,20 |
| | | 63 | 671670 | 7,77 |
| | Average by groups | 71 | 4843680 | 56,06 |
| Group III, lands of average value 41-60 | Mountain chestnut ordinary | 60 | 299420 | 3,40 |
| | Mountain chestnut light | 59 | 125250 | 1,45 |
| | Meadow chestnut | 56 | 261850 | 3,03 |
| | Chestnut light | 53 | 87420 | 1,01 |
| | Mountain gray-brown light | 45 | 33040 | 0,38 |
| | Light gray soils | 44 | 61670 | 0,71 |
| | Average by groups | 56 | 868850 | 10,05 |
| Group IV, low-quality lands 21-40 points | Gray-brown | 40 | 166500 | 1,93 |
| | Average by groups | 40 | 166500 | 1,93 |
| Group V, conditionally unsuitable lands below 20 points | Primitive mountain meadow soils | 20 | 150980 | 1,75 |
| | Underdeveloped mountain chernozems | 24 | 2700 | 0,03 |
| | Underdeveloped chestnut soils | 19 | 47440 | 0,55 |
| | Underdeveloped mountain forest brown soils | 17 | 7200 | 0,08 |
| | Underdeveloped mountain chestnut soils | 12 | 105600 | 1,22 |
| | Deluvial solonchaks | 10 | 3204011 | 0,37 |
| | Alluvial solonchaks | 10 | 800 | 0,02 |
| | Volcanic solonchaks | 10 | 6570 | 0,08 |
| | Solonetz soils | 10 | 7470 | 0,09 |
| | Takyr | 10 | 2000 | 0,02 |
| | Humpy sands | 10 | 36270 | 0,42 |
| | Dune sands | 10 | 109350 | 0,14 |
| | Disturbed soils, waste oil fields | 10 | 11700 | 0,06 |
| | Disturbed by mining operations | 10 | 5400 | 0,68 |
| | Pebble river beds | 10 | 59040 | 1,81 |
| | Rocky outcrops | 10 | 156510 | 0,55 |
| | Outcrops of saliferous clay rocks | 10 | 47700 | 1,71 |
| | Primitive sierozems | 9 | 148110 | 1,23 |
| | Average by groups | 12 | 947880 | 10,96 |
| | | Total | 66 | 8641500 |

Group I is high-quality land and includes soils with optimal ecological properties and bedding conditions for successful growth of agricultural crops. Soils included in Group I have a fairly powerful humus horizon compared to other common soils. The granulometric composition of these soils is mainly clayey or loamy, they are well structured and have a favorable water-air regime and have optimal ecological properties and bedding conditions for successful growth of agricultural crops. When using soils of this group for agricultural purposes, no preliminary improvements are required, and they are mainly

used for grain crops, grapes, tea, cotton, garden and vegetable crops. To maintain the natural fertility of the above soils, it is necessary to observe forest reclamation anti-erosion measures and agrotechnical rules for growing agricultural crops.

Lands included in Group II are considered to be of good quality. This group includes soils with slightly worse properties and bedding conditions compared to the first group of soils. The granulometric composition of these soils is clayey and loamy with a favorable water-air regime. When using these soils in agricultural production, it is necessary to observe the rules for crop rotation, forest reclamation and anti-erosion measures, rationally use irrigation water, and apply organomineral fertilizers.

Lands of group III mainly belong to the average quality and according to fertility these soils are classified as V-VI class of quality. Soils of this agricultural production group constitute the main fund of arable lands of the country and cotton, grape and tea plantations, vegetable crops are cultivated on their vast tracts. In order to obtain a high yield on these soils it is necessary to carry out clear melioration measures – to observe irrigation rules, to prevent secondary salinization, to widely use organic and mineral fertilizers.

IV group of soils in comparison with the lands of the III group of lower quality. These include gray-brown soils and varieties of some types of soils, where under the influence of varying degrees of salinization, solonchic, erosion, fertility has significantly worsened. These soils in the soil quality scale are estimated within 21-40 points and belong to III-IV classes. The low quality of these soils determines the need for a differentiated approach to their agricultural development: it is necessary to apply complex and expensive melioration measures, be sure to carry out irrigation, use organomineral fertilizers, observe and implement agroforestry and agrotechnical rules. On these soils, where pastures are located, the natural vegetation cover has almost completely been destroyed. Given this, it is necessary to carry out artificial sowing of grasses and observe their correct irrigation, and it is also necessary to fix the existing ravines by planting trees and shrubs.

Group V soils are conditionally unsuitable for agricultural production. These soils are not used in agriculture due to strong salinization, rockiness, strong solonchic, swampiness and other features that radically reduce their fertility. Some of these soils can be used for agricultural purposes in the future with the use of long-term erosion-protective forest reclamation and drainage measures.

The conducted agro-industrial grouping of soils of Azerbaijan, based on their appraisal points, makes it possible to identify average weighted points, coefficients of comparative land value (CLVL) and their area for individual qualitative groups of land (see Table 2).

The new scheme of the general agro-production grouping of soils developed by us helps to identify soil groups that need agro-meliorative measures to improve them. In general, this grouping unites all soil types and subtypes common in Azerbaijan. Knowing the soil type score and agro-production group, it is possible to determine on which soils it is necessary to carry out certain agronomic measures (melioration, fertilization, anti-erosion measures, irrigation, etc.) to radically improve the productivity of agricultural soils.

Table 2. Average weighted land quality scores and coefficient of comparative land worthiness (CLW) for agricultural land groups in Azerbaijan

| Quantitative groups of lands | Weighted average scores | CLW | Square | |
|----------------------------------|-------------------------|-------------|----------------|--------------|
| | | | ha | % |
| 1 | 2 | 3 | 4 | 5 |
| I Best Lands | 86 | 1,30 | 1814790 | 21,00 |
| II Good Lands | 71 | 1,08 | 4843680 | 56,06 |
| III Lands of Average Value | 56 | 0,85 | 868650 | 10,05 |
| IV Lands of Decreased Value | 40 | 0,61 | 166500 | 1,93 |
| V Conditionally Unsuitable Lands | 12 | 0,18 | 947880 | 10,96 |
| Total for Azerbaijan | 66 | 1,00 | 8641500 | 100,0 |

As can be seen from Table 2, the agro-industrial soil grouping is essentially generalized and chopped off. The difference between groups is on average 20 points, whereas in the appraisal, even one point of difference between soils is taken into account in the calculation. But this creates a complex, sometimes mosaic system that is difficult for land managers, agronomists, meliorators and other specialists - not soil scientists - to master. For them, agro-groupings of soils will be very useful for general decisions, but, of course, when solving specific issues, it will always be necessary to resort to detailed appraisal of soils, which takes into account the subtle environmental nuances of a particular territory. But the most important place where agro-grouping of soils can be very useful is when consolidating agricultural lands in the country.

Land consolidation is one of the most effective tools in land management that can improve the structure of agricultural land in the country. In addition, it can improve national economic and social efficiency and bring benefits to both private landowners and society as a whole [1].

The term "land consolidation" means the unification, merging of lands, in land management this is an event to eliminate multi-strip, destroy interstriped, narrow-strip and distant lands, which were carried out at various historical stages, in order to eliminate the shortcomings of land ownership and consolidate a large number of small plots belonging to individual landowners into large plots located in one place [13]. Currently, there are many issues related to land consolidation in Azerbaijan, and they are relevant in all regions of the country. Since, as a result of land reforms carried out in the country in the late nineties, agricultural lands have become excessively fragmented (see Fig. 1).

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Fig. 1. Territories of large land masses broken up into small land plots

Land consolidation is one of the most effective tools in land management that can improve the structure of agricultural land in the country. In addition, it can improve national economic and social efficiency and bring benefits to both private landowners and society as a whole [3]. The term "land consolidation" means the unification, merging of lands, in land management this is an event to eliminate multi-strip, destroy interstriped, narrow-strip and distant lands, which were carried out at various historical stages, in order to eliminate the shortcomings of land ownership and consolidate a large number of small plots belonging to individual landowners into large plots located in one place [13]. Currently, there are many issues related to land consolidation in Azerbaijan, and they are relevant in all regions of the country. Since, as a result of land reforms carried out in the country in the late nineties, agricultural lands have become excessively fragmented (see Fig. 1).

Thus, as a result of the first stage of land reforms carried out in the country, 1,309,854 hectares of land from collective and state farms were privatized and transferred free of charge to the private ownership of citizens of the country; in other words, 3,442,778 people became landowners.

The land reform in the country was carried out in a fairly short time. During the reform, naturally, there were certain underestimations [9]. An example of this can be shown by the average size of a land share per person, where it varies in the republic from 0.10 hectares to 1.3 hectares, and this confirms the fact that agricultural lands in Azerbaijan have been subject to strong fragmentation and this is one of the main underestimations of the land reform.

To date, in the country for the purpose of self-occupation and production of agricultural products, from the single land fund of the country (from the category of agricultural land), according to the results of the subsequent stages of reforms, on a free basis, allocated to citizens of the country, the area of land shares has reached 1 million 442 thousand 476 hectares of land. (Table 3).

The numerous fragmentations of agricultural lands and the small areas of land shares in Azerbaijan are currently the main obstacle to their rational use. Today, each resident of Azerbaijan has only about 0.56 hectares of land suitable for agriculture. Given the current situation with agricultural lands in our country, in our opinion, the relevance of the issue of land consolidation for these lands is beyond doubt [7].

Table 3-Distribution of privately owned land resources by regions of the country

| No | Regions | Total area | Arable land | Perennial planting | Hay-fields | Household plots | Total | Unused areas |
|----|---------------------|----------------|----------------|--------------------|--------------|-----------------|----------------|--------------|
| 1 | Absheron | 14693 | 8662 | 1960 | 188 | 1965 | 12775 | 1918 |
| 2 | Ganja-Gazakh | 245476 | 167927 | 2975 | 30510 | 40886 | 242298 | 3178 |
| 3 | Sheki-Zagatala | 203274 | 147984 | 35294 | 1129 | 17196 | 201603 | 1671 |
| 4 | Lankaran-Astra | 150488 | 105992 | 8206 | 10361 | 23927 | 148486 | 2002 |
| 5 | Guba-Khachmaz | 179607 | 110921 | 26301 | 26220 | 14052 | 177494 | 2113 |
| 6 | Aran | 615662 | 522088 | 9790 | 2660 | 73917 | 608455 | 7207 |
| 7 | Karabakh | 49996 | 42149 | 1891 | - | 5594 | 49634 | 362 |
| 8 | Mountainous Shirvan | 150176 | 127362 | 8514 | 4361 | 8683 | 148920 | 1256 |
| 9 | Nakhichevan | 56286 | 38711 | 761 | 2796 | 12610 | 54878 | 1408 |
| | Total | 1665658 | 1271796 | 95692 | 78225 | 198830 | 1644543 | 21115 |

Conclusion:

According to the authors, the reason for the entire negative process with agricultural lands, in addition to the small areas of land shares, was also the fact that during the land reform, land shares were allocated to citizens of the country without taking into account the agroecological properties of the soil, ground and relief conditions of the area [9]. All of the above allows us to conclude that human activity is a powerful environmental factor affecting the soil and vegetation. Only a timely study of the consequences of this impact can contribute to increasing soil productivity, identifying optimal conditions for

the growth of various agricultural crops, which in turn will increase their yield. In our opinion, to achieve all this, it is necessary that when consolidating agricultural lands in the country, the results of agro-industrial grouping of soils are used without fail.

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