

## Basics of Anti-Erosion Protection of Cultivated Soils of Mountain and Foothill Areas of Azerbaijan

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### Abstract

The article deals with the problem of protection of soil from erosion soil erosion Problems. There is an urgent task of national importance, a decision that deepens year by year. Admittedly, it is associated with both the knowledge of the outstanding role of the soil in the life of the biosphere, and recognizing that allowing 43.3% of the whole territory of Azerbaijan have experienced any type of erosion. Losing the biological activity of almost degradirovalos. Intensively developed widespread erosion. However, this recognized that to date has convincingly shown that the soil is not only a fundamental means of agricultural production, but also an essential component of terrestrial ecosystems, powerful battery energy on Earth, a regulator of the whole the atmosphere and the hydrosphere, reliable barrier not pollutant migration paths. To cause tremendous damage to soil erosion in the country's economy.

**Keywords:** Gipsometricheskie Border; Erosion Protection; Topography; Groundwater; Cultivated Plant

Protection of agricultural land against degradation caused by erosive processes have their purpose:

- Limiting the development and strengthening of erosion;
- Protection of the productive capacity of the soil and prevent adverse changes;
- To counteract the emergence of adverse water conditions and slowing the maelstrom in agro ecosystems;
- Prevention of deformation of the terrain.

### Ascribed to them

#### Anti-erosion technical activities %

- Determination of the herbaceous boundary between agricultural and forestry land use based on environmental grounds,
- Strengthening of drain line
- Safety structures within complexes converted land,
- Terracing.

### Agricultural Erosion

- Selection and cultivation of erosion-crops and crop rotations

### Progress in the study and discussion of materials

"Due to the unique geology of the soil of the Republic of mountainous quite resistant to development of erosion processes. However, wash 1 cm of soil in mountainous terrain located on thick rock has more negative value in comparison with soil with deep profile"-Fatyga.

### Fundamentals of soil anti-erosion green land

That moment verdure, consisting of perennial grasses and dicotyledonous plants, due to its well-developed root system strongly reinforcing the topsoil, possess effective ant erosion properties. In addition to the above advantages, it should be noted particularly important functions: soil formation, structure formation and phytosanitary.

In principle, believe that the density of vegetation increases the anti-erosion vegetation impacts due to:

- Prevent the ingress of rain drops on the surface of the soil
- Improve soil permeability
- Increase the absorbency of soil
- Protect the surface before flushing.

A favorable condition for the development of grassy and green vegetation in the mountains is heavy rainfall and elevated Plains groundwater. This is especially important when considering its protective function in arid areas.

Slopes with inclines exceeding 120 on low skeletal soils, located above the so-called border gipsometrisheskoj cultivation of field crops must be zaluzheny. For the effective implementation of security features green lands require proper care of selection:

- Species and varieties of cereals and leguminous plants, taking into account the specifics of their specific development and germination
- Mineral and organic fertilizers (dose and form) of the potential of plants nutrients
- Agricultural techniques and timetables for their implementation, which should be always across slopes.

Green lands used for feed production, require appropriate care. Stoptannoe and strong vyedennoe pasture protects the soil better not arable fields. Overgrazing numerous animals raises at the beginning of the change in the composition of the vegetation, and after prolonged use of the almost complete disappearance of plants. It is especially dangerous in the mountains because the open soil exposed to leachate may run off and after intense rains of entire layers of turf to slide down.

Therefore, the Organization should pick a vypasenija load of pastures to the dynamics of growth and development of vegetation and its productive capacity during the growing season. Also essential is the markup of pastures, adapted to prevailing conditions as well as the correct layout and training sections for animal grazing and watering places. The most acceptable black use of land but on too steep slopes is better to short grass.

In cases of need renovation or restoration of grass should remain very cautious. Instead of plowing and other aggressive techniques use a harrowing and over seeding with application of the appropriate fertilizer.

To better preserve the moisture in the soil can hold furrowing of cut turf along the horizontal using special tools. These activities should be applied on the gentle slopes, where there is no fear of shear cut turf.

Plant performs security function bodies also dry valleys. Depending on rainfall and runoff summer opportunities, one should bear in mind the difficulties in the economic use of grass. In such places, you should sow plants resistant to siltation and temporary lack of moisture.

### Fundamentals of anti-erosion protection of arable land

Arable soils the most pliable on the destructive action of erosion processes. Possibility of arable soil cultivation in mountainous terrain depends on causing the relevant techniques in the proper selection of cultivated plants. They must be applied taking into account the constraints to erosion allowed dimensions so that the soil-layer growth exceeded the oppose the flushing out of the soil.

In mountain conditions on arable soils mainly develops water and mechanical (mechanical) erosion. Other types of erosion have less value.

Runoff rain or melt water surface slope causes erosion and the movement of soil. During rain or snow water flowing down streams of strong form ruts, which in extreme cases reach the rocky soil, but, in principle, not exceed the plow layer and are destroyed during processing of arable land.

Mechanical erosion is the result of inappropriate farming or land management. On the slopes during operation of agro technical guns destruction occurs in soil density, that contribute to displacement down soil particles or structural units. This process is accompanied by the work of all the guns used for tillage or caring for plants exist. The biggest gain this phenomenon occurs when ploughing directed along the flanks or across the slopes, if Plast is delayed along the slope. This can lead to a shift in soil from 30 cm to 1 m per year.

### Anti-erosion technical activities

They enable the use of soils under farmland even in areas with strong erosion risk. Characterized by good efficacy, require large monetary and labour costs.

One of them is a transverse (relative to the slope) field layout with roads along the slope being processed. Under such a structure, the fields look elongated rectangles, and their borders are in the shape of a high zachernennyh of slopes reinforced with stones or bushes. Along roads must be planted trees. Such a decision can be use on the slopes with slope-dot 60, subject to reclamation project. Its base is in the markup and (stability) the boundaries of fields.

Other effective trick is creating a belt structure fields. Across the field dismembered narrow field of considerable length, size-dependent slope width belt fields must not exceed 100 m. broader fields lose anti-erosion protection function. The tape should be sowing AC plants, good covering soil and plants that do not have protective properties. Band structure of fields has a lot of advantages:

- It is well adapted to the terrain,
- Saves horizontal execution processing agricultural
- Restricts the water flow with the slope and the rise of potholes,
- Promotes the agricultural use of the slope differential soil cover (power, fertility of hydration).

Tape a field you can enter the slopes with this bias, which does not restrict the transverse and longitudinal plowing.

### Vnutripolevye event

Proper implement counter-erosion activities due to the determination of the degree of threat from erosion, and dissemination, as well as the concentration of expiring water periodically.

Water retention on the slopes contribute to application hydroscopic furrows, which vypahivajut before sowing. Hydroscopic system of furrows, which vypahivajut before sowing. Hydroscopic system of furrows limited time 3 - 10 water flow along the slope and can lead to the apprehension of the whole or the greater part of the flowing water. For them the most suitable is the plough with elongation of segmental or plow blade.

In some countries apply the system of hydroscopic hole plowed plow with pochvougubitelem.

### Terracing

On a ploughed field, located on a slope of over 60 increases soil Washout, it is moving along during processing, which contributes to the development of mechanical (agricultural) erosion.

Micro relief, created during the agricultural processing, as well as a system of furrows or rollers (beds) inherent in water retention, is declining, with increasing slope steepness. In these fields the only effective way to counter erosion is terracing to artificially reduce their steepness. Good ways is also the establishment of the tape boxes. Belt width should not be less than 20m.

It is recommended that you allocate on a slope not less than 3 fields of the counting area, slope and depth (power) of a soil layer. Margins should be straight and so when processing areas should be deleted cause deviations of the horizontally. Excluded sites follow turn into plants, herbs or plant trees upholster. After some time formed borders transformed into high slopes and fields between them become less bias.

For terracing slope suitable ploughs, bulldozers and graders. Effect of terracing can be obtained applying plowing plow the fields located on the negotiable across slopes, tearing off Plast down the slope, causing the growth of slopes for about 0.2m per year.

The terraced hillsides, strengthening stone walls, very suitable for planting vineyards. They are an example of an ant erosion landscape, connecting natural elements (vineyards) with anti-erosion techniques.

Terracing of slopes subjected to intense erosion, are the most effective ways to minimize erosion damage.

### Drain line protection

Arable soil should be protected before the influence of floating water. In this regard, existing streams, gullies, ditches and other ways of surface water outflow should be settled so as to safely and quickly wick away excess water to the corresponding water receivers. They should be well protected from the gap. A network of roads between fields, temporarily conductive water must be adapted to transport its surplus.

So located and built roads, temporarily conductive water, lengthen and increase the density of a hydrographic network. Therefore, the projected strengthening outflow lines respectively, water and road networks is an important technical event.

### Agricultural anti-erosion techniques

Erosion events on arable soils is closely related to technical solutions. They are, above all, cross-slope towards conducting fieldwork in accordance with soil conditions and the height above sea level.

### Processing of arable land

On the terraces and tape boxes across the slopes, parallel to spend plowing limits fields. On slopes with an inclination of up to 30 without markup terraces and belt tilling fields hold too across the slopes. A higher slope terrain reviews fieldwork slightly obliquely and running in autumn zjablevoj plowing to better apprehend snow in winter and more accumulation of moisture.

Ploughing depth should be picked up refers to the capacity of the soil profile. Within the soles of the slope should be deep plowing, and most small on the slopes. Tilling is better to perform reversible or balance plough, delaying seam up the slope.

When processing the fields located on the slopes of the cultivator is recommend the use of tillage in conjunction with mulching the soil surface plant remains or direct seeding. This system improves handling strength of soil structure, improve the absorption of rainwater and limit runoff. For this purpose apply cultivators or units, State from Harrow, cultivator and a skating rink.

In addition, times 4 - 5 should be years chiseling soil, which improves its hygroscopic and contributes to water penetration into the deeper layers of soil, where the starting date field work depends largely on the location height of arable land above sea level.

Processing should start with the most low-lying fields and in sequence, as the f favorable conditions for carrying out agricultural works move to land use fields.

Slopes should be processed quickly, while not dry off, and field work, starting with the most gently rolling, southern slopes turning gradually to other expositions, and finally to the top.

Least cultivate the soil in the valleys and at the foot of the slopes. where the direction of tillage all other instruments should match the direction of sloughing.

In connection with field work in mountainous areas in the most short terms, recommend aggregation guns (plow or tiller) with a chisel or construction. Simultaneous use of guns contributes to a better alignment and condensation of arable land and to restrict moisture loss.

### Fertilizer

In mountainous areas, with a strong differentiation of soil-climatic conditions unreasonable application of the same doses of fertilizers on the peaks, slopes and tradable slopes. The most intensive reviews fertilize less slopes, peaks, the lowest dose should be used in the lower parts of the slopes.

On the slopes above should apply organic and green manure fertilizers, while in the higher parts of the slopes and peaks of more appropriate use of mineral fertilizers.

Important technological principle is the separation of the total quantity of fertilizer in small doses and rapid mixing of the soil. This prevents washout and the flow of nutrients to surface waters. You should also apply the least soluble fertilizers with high percentage content of nutrients, granulated, with alkaline reaction.

### Planting and seeding

In a very important direction of agriculture anti-erosion sowing seeds and planting. It must match the direction of the main field work and performed across slopes. Practically the sowing of seeds is inconvenient and could lead to uneven distribution of seeds. If enforced, the skeletal soils, seeds can be positioned at different depths and scattered on the sides. In such cases, you should carefully monitor its implementation.

In intensive crop farms should be applied cross seeding or reduces the width of spaces between rows. Held at the facilities of the research field trials showed mixed results for the largest harvest, but confirmed that such kinds of seeding help prevent or reduce the intensity of development or degree limit erosion.

In all areas it turned out positive application of eroded pasture culture. This was confirmed by studies conducted in the mountainous regions of Khachmaz, Guba-Shirvan, Ganja-Gazakh and Sheki-zakatala area in Azerbaijan.

This role well perform perennial legumes: clover and Lucerne, and in Azerbaijan-sainfoin and ornamental grasses. In this way, you can restrict tilling the soil and greatly limit state of the soil without vegetation.

A basic precondition for the proper growth and development of cultivated plants is their timely sowing or planting. It affects the protective properties of individual plant species and their productivity. In mountainous areas sowing date depends on the height of the location above sea level.

The earliest sowings should be conducted on the most low-lying fields and gradually move to the southern and South-western slopes to maximize conservation of soil moisture. Seeding rate on the slopes and above located fields should be increased and the slopes of the grain be found deeper, because the deeper the planting provides shoots moisture and protects the seeds and seedlings before flushing. In the valleys of the recommend smaller sowing, as in the case of flushing the soil there is swimming.

In connection with the worst soil conditions on the slopes with more severe thermal conditions on the higher located boxes in the growth and development of plants, including tillering grains, limited, so it is necessary to carry out more dense planting.

### Care planting weed

On eroded soils should be the maximum limit handling of spacing as friable, AMG, zalegajushhaja on dense substrate soil is very amenable to scour and movement. Therefore, the Elimination of weeds by a gouge should be used to a limited extent.

Application of chemical weed counteracts the leachate may run off the soil, but increases the threat of penetration of plant protection means to the creeks and rivers, and therefore should be used with great caution. Should be characterized by high efficiency herbicides and low toxicity, and apply them in small doses.

### Selection of plants cultivated on eroded soils

Erosion protective properties of cultivated plants are overlapping parts of its reinforcement by elevated soil root system. Distribution and sowing density strongly affect effects when plants are placed evenly and integral overlap of soil surface.

The magnitude and nature of the vegetation depends on the type of plants and soil, and mainly from the direction of the series. Alignments generated during the processing of soil across the slopes helps to create a kind of micro relief, which can limit the speed of run-off.

More gently rolling fields this micro relief is rapidly disappearing, but properly distributed within the ranks of the vegetation, is an additional obstacle to alignment and reduces water flow. Cereal and legume forms a thick, dense hedges, and, in the case of tilled, the role of the obstacles increasingly performs a number (range).

In the first phases of plant development are important traits such as density of tillering, length solemnity or stalk and their rigidity. The influence of these signs is particularly noticeable in some phases of the development of cereals, which distinguishes this group among other plants.

In the case of cultivated plants growing on high ridges, more important is the possibility of accumulation of rain water in the aisles, though sometimes the water breaks the ridge and causes a lot of linear erosion.

Soil conservation cultural plants closely related to climatic conditions. The most valuable plants growing all year.

Crucial features, relative to the protective abilities of plants is the height of the growth dynamics of the cornfields, multiple layers of overlapping leaves, the upper surface of the leaf, the height of the main mass of leaves etc.

Protective properties of individual plants vary in individual phases of their development, the most poorly they manifest from germination to the overlapping fields, and most strongly at the flowering stage.

The best protective properties have ornamental grasses, cultivated on arable land in the travopolnoj system or grass mixture with legumes, as well as perennial legumes. They protect the soil almost 100% throughout the year.

Successive places occupy winter (90%), spring-70% and only 30% of tilled.

### Anti-erosion crop rotation

The main crop design in mountainous areas is the adaptation of individual species and varieties of plants to changing climatic conditions associated with a height of above sea level and agro-ecological zones (top, slopes, slopes soles), where conditions of development of the plant determines the slope Exposition, slope and soil diversity.

On eroded sites should use species and varieties of plants with good security abilities, resistant to harsh natural conditions with the so-called small sensitivity to topography, i.e., the leachate may run off and impoverishment. Winter must have good winter hardiness, drought-resistant device capability to the discovery of roots, fracture, lodging and overlapping sediments.

The legkovolnistyh peaks (up to 30) Yves valleys in the lower altitudinal zones in crop rotations more acceptable content of cereals (about 50%) half less cultivated and perennial forage plants, and most low oil. Selection of plants and their alternation can be adapted to the needs and nature of the economy.



On slopes with a gradient of up to 60 in the lower located areas and easy gently rolling stations (up to 30) located above zones should be used anti-erosion crop rotation. They should dominate the winter and perennial legumes with herbs. The proportion of plants, good soil coverage must be about 60% of the cultivated area.

On steeper slopes (from 0 to 6 120) and above located arable land should be used anti-erosion crop rotation, in which the proportion of well protected plants would reach about 88% of the area.

Distribution of cultivated plants shall be such that the fields are well protected ground, interspersed with fields of plants on the lower erosion virtues. Soil washed off with upstream, worse protected fields should be intercepted at below located field sown good guarded culture. Practically we are talking about alternation fields cultivated with fields sown with cereals or perennial legumes.

### The basics of water safety in connection with the erosive processes

All the erosive processes have a direct or indirect impact on the formation of water resources through:

- Reduction of water permeability and capacious soils
- Increase in runoff,
- Raising water levels in rivers and flood education
- Siltation of rivers and reservoirs smyvami eroded land,
- Jevtrofizacija and contamination of watercourses severely (nitrogen, phosphorus, pesticides).

Significant factor affecting the water regime in the mountains, is the development of linear erosion dismembered ruts and gullies mountain land.

The most important task is to prevent the erosion of the increased water retention capacity of the soil, by making the soil runoff drain.

In mountain areas the best for water management is the structure of land use with a predominance of forest formations and in the structure of farmland-prevalence of grassy vegetation.

There is a view that in these areas the forest should take between 35 to 60% of the total area.

The big role is played not only the percentage of forested areas, but also their location-the most valuable from the viewpoint of the formation of the water balance, are large and thick, cohesive forest tracts [1-22].

### Conclusion

Protecting the land against degradation primarily by erosion, is one of the most important tasks of the environmental problems which can only be a comprehensive study of the deep causes and habitats of its development, through the elaboration of scientific foundations protection and rational use of soil resources. Establishing a scientific development concept of soil erosion research that will contribute to the development of scientific bases of ecologically balanced use of soil in the Republic.

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