Method for control of soil erosion on slopes

A method for control of soil erosion on slopes allowing for an increase of surface water infiltration into deeper layers of soil and making the use of slopes possible for the agriculture or pomiculture purposes is characterized in that anti-erosion terraces up to 4 m wide are built on slopes of inclination of over 6% and in the terraces one cuts draining ditches 0.2 m wide and 1.0 m deep and the one fills the ditches from their bottom up to the depth of 0.8 m below the ground level with stones of diameter of 40-80 mm, then up to the depth of 0.30 m below the ground level one fills the ditch with rounded pebbles of the diameter of 10-40 mm and the surface layer of the ditch one fills with gravel of 2-10 mm diameter up to the ground level.

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Description

[0001] The subject of this invention is a method for control of soil erosion on slopes which allows for an increase of surface water infiltration into deeper layers of soil and which makes the use of slopes possible for the agriculture or pomiculture purposes.

[0002] A soil erosion control method on slopes is known from US patent 6835761 where in order to decrease the slope degradation rate by water soil erosion it was proposed to strengthen the soil surface by temporary reinforcement of soil surface with dividers made of wooden fibers, polymer fertilizers straw and the like. Application of the dividers made of waste materials has no considerable effect on increase of surface water infiltration into the soil.

[0003] Other known slope soil erosion control method involves placing the rolls made of different kind of fibrous materials along the slope. The proposed materials include for example straw, flax or hemp. The rolls in the proposed method should have a diameter of at least 10 cm. The application of rolls helps to reduce the velocity and volume of surface run-off water and at the same time it causes decrease of soil erosion rate. Nonetheless the infiltration rate remains dependent on the physical properties of local soil. The fiber rolls should be placed in close distance one to another and they should be correctly fixed in the upper layer of the soil in order to avoid the risk of rolls dislocation by surface run-off water generated by extreme rainfall events or rapid thaws. The rolls should be fixed in a distance of at least 1-1,5 meter from one roll to another. The setting of roll network along the slope surface may also disturb the agricultural and fruit growing activities.

[0004] US patent 5595458 describes a method of slopes protection against water erosion in which the horizontal rows of bags filled with sand, gravel, stones or biofilter materials made of polyethylene are placed on the slope. In this method the rows are used to stop or slow down the surface run-off water. Placing the sand, gravel, stone or polymer bags on the slope can only be a temporary solution, with a rather limited range of application. Furthermore, it obstructs the agricultural works on the slope. There is also a high risk of bags damage, which could lead to spill out or washing away of the bags fillin. This would interrupt the barrier continuity. Moreover application of sand, gravel, stone or polymer filled bags does not increase the infiltration rate of surface water into deeper layers of soil profile.

[0005] Also known is a slopes erosion control method in which it is proposed to cover the slope surface with the geotextiles and mats in order to decrease the soil erosion rate. US patents 4875803, 5364206, 7156587 describe different shapes, fixing methods or materials proposed for this method. The use of geotextiles and mats to prevent soil erosion of slopes is an expensive, limited range and temporary solution. It also limits the agricultural and fruit growing activities on the given slope. Moreover, use of geotextiles and mats does not increase the surface water infiltration into soils and disturbs the natural heat circle in the soil.

[0006] There is a known method in which the application of a system of earth dikes and restricting humps is proposed to collect and redirect surface run-off water. It is proposed that the restricting hump be made of local soil mechanically strengthened while the drainage dike of trapezoidal shape with maximum slope inclination of 2:1 is proposed to be constructed in the top layer of soil. This system of soil erosion control requires a high workload, both during construction and exploitation phase. The hardening of humps and strengthening of the bottom and the walls of draining dikes is necessary. The system implementation is unprofitable in regions of highly erodible soils. The use of earth humps and drainage dikes system may also disturb the agricultural and fruit growing activities by creating obstacles for the use of mechanical equipment. Moreover, surface water redirecting does not increase the water infiltration rate into soil profile.

[0007] Also known is a traditional method of soil erosion control on slopes, in which it is proposed to use horizontally orientated terraces in order to limit the soil erosion caused by water. Terraces limit the velocity and volume of surface run-off water and hence limit the soil erosion rate. Implementation of terraces on steep slopes enables the agricultural and fruit growing activities and allows for use of mechanical equipment. Water infiltration and water retention in this case is directly dependent on the physical properties of the slope soil as well as its conductive properties.

[0008] In other known soil erosion control method, described in Polish patent 188870 it is proposed that horizontally orientated terraces are additionally equipped with draining infiltration ditches with sand filling. According to this method a 0.3 m wide and 0.8 m deep ditch is dug a on every terrace and it is filled with sand. The main aim of the use of the sand ditches is to improve the surface run-off water infiltration into deeper layers of soil But use of sand filling in orchards on loess soils quickly leads to alluviation of soil particles into the draining ditch, rapid decrease of conductivity of saturated sand filling, rebuilding of soil profile. As a result the efficiency of soil control system drops. The use of terraces with drainage ditches has no negative impact on the agricultural and fruit-growing activities on the given slopes.

[0009] The method according to present invention allows for an increase of surface water infiltration into deeper layers of soil and makes the use of slopes with terraces possible for agriculture or pomiculture purposes and is characterised in that anti-erosion terraces up to 4.0 m wide are built on slopes of inclination of over 6% and in the terraces one prepares infiltration ditches 0.2 m wide and 1.0 m deep, filled from their bottom up to the depth of 0.8 m below the ground level with stones of diameter of 40-80 mm, then up to the depth of 0.30 m below the ground level the ditch is filled with gravel of the diameter of 10-40 mm and the surface layer of the ditch is filled
with gravel of 2-10 mm diameter up to the ground level.

[0010] The beneficial effect of the current invention is that the use of the gravel-stone filling of the infiltration ditch clearly increases its water capacity and volume of surface water infiltrating into the soil profile. The solution also provides for longer duration of exploitation which is due to minimization of alluviation and sedimentation processes which influence the infiltration rate in surface layer. The implementation of infiltration ditch filled with the described layers of stones and gravel does not affect the possibility of agricultural and fruit-growing activities, including the use of heavy equipment.

[0011] A method for control of soil erosion on slopes which allows for an increase of surface water infiltration into deeper layers of soil and makes the use of slopes possible for the agriculture or pomiculture purposes is characterised in that anti-erosion terraces up to 4 m wide are built on slopes of inclination of over 6% and in the terraces one prepares infiltration ditches 0.2 m wide and 1.0 m deep, filled from their bottom up to the depth of 0.8 m below the ground level with stones of diameter of 40-80 mm, then up to the depth of 0.30 m below the ground level the ditch is filled with gravel of the diameter of 10-40 mm and the surface layer of the ditch is filled with gravel of 2-10 mm diameter up to the ground level.

Claims

1. A method for control of soil erosion on slopes allowing for an increase of surface water infiltration into deeper layers of soil and making the use of slopes possible for the agriculture or pomiculture purposes characterised in that anti-erosion terraces up to 4 m wide are built on slopes of inclination of over 6% and in the terraces one cuts infiltration ditches 0.2 m wide and 1.0 m deep and the one fills the ditches from their bottom up to the depth of 0.8 m below the ground level with stones of diameter of 40-80 mm, then up to the depth of 0.30 m below the ground level one fills the ditch with gravel of the diameter of 10-40 mm and the surface layer of the ditch one fills with gravel of 2-10 mm diameter up to the ground level.
# EUROPEAN SEARCH REPORT

**Application Number**
EP 08 16 7665

## DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category</th>
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