REINFORCED HYDROSEEDING

ROADS

MONGUELFO (BZ)

The mulch fibre-reinforced hydroseeding system makes it possible to grass surfaces where it is not generally possible to achieve acceptable results with simple hydroseeding. It represents the ideal solution in environments characterised by moderately steep slopes, no more than 35-40°. The slopes in question in the Monguelfo area (BZ) were characterised by gradients of around 25 to 30° with a substrate poor in organic matter mainly composed of coarse debris in a sandy loam matrix.

The PROTECTIVE SHEET or HYDROFIBRE MULCH are vegetable fibres acting as a mulch to protect seeds from the weather. Wood fibre mulches with a particular length and processing are specific for hydroseeding. The level of coverage is given by the length of the fibres, which bind to the adhesive, forming a structure that is resistant to erosion. The green colour of the fibres gives uniform coverage without unnecessary product waste. The fibres also absorb a greater quantity of water, reducing runoff and maintaining a higher moisture level, thus improving germination.

The result is clearly shown in the second photograph taken at a distance of about one month after grassing.

GARDENS

Hydroseeding represents a new frontier in seeding in gardens, especially in the management of small to medium green areas. The benefits are substantial with a significant reduction in implementation times through more flexible application of all the constituent components of the mixtures in a single stage.

CASE HISTORY: HOTEL GARDALAND - PESCHIERA (VR)

PROBLEM

Hotel Gardaland, in the opening phase, had a garden park which still required grassing in the middle of summer (August 2004). There were two main problems: the difficulties of grassing using traditional techniques given the continuous changes of slope, the numerous plants present and the considerable presence of tourists to whom it was necessary to present a pleasant area from an environmental perspective.

SOLUTION

The only possibility was to carry out hydroseeding. Application took place on 18 August and wood fibre mulch-reinforced hydroseeding was chosen as, given that the period was not exactly favourable, it provided a greater chance of a successful outcome, as mulch offers greater seed protection and promotes water retention, thus improving germination. In addition, the green colour meant that even immediately following application, there was a pleasant visual impact. (photo 2)

The result is evident in photo 3 where you can see complete, uniform coverage

Stabilisation and consolidation of the green area

Problems and solutions

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HYDROMAT® H.A.B. – Hydraulically Applied Blanket

CASE HISTORY: GRANDE RACCORDO ANULARE - ROME

PROBLEM: The enlargement of the current Grande Raccordo Anulare roadway in Rome, at the trenched stretches, made it necessary to excavate and move back the existing slopes characterised by highly erodible tuffaceous materials of volcanic origin. The exposure of these slopes to the weather and to uncontrolled runoff of rainwater, due to the lack of vegetation, had resulted in the creation of deep erosion furrows which had developed all over on all slopes (photo 1). It is necessary to emphasise the poverty of the pedological substrate and the nevertheless steep slopes of around 45° - 50% (as shown in photo 3).

1

2

3

FIRST SOLUTION ENVISAGED This involved using a synthetic three-dimensional geomat, clogged with topsoil. The lack of complete adhesion between the geomat and the substrate meant that this attempt was ineffective, as is clearly shown in photo 2, causing multiple problems.

4

5

6

FULL SERVICE SOLUTION: the problem was solved by hydroseeding using a **Hydraulically Applied Blanket HYDROMAT®** performing application in 3 stages. The first two applications (photo 3) involved adding approximately 800-900 g/m² of organic matter to create a substrate essential to the vegetation, while the third stage involved covering with the H.A.B. and an organo-mineral fertiliser for a total quantity of approx. 600 g/m² (photo 4). For the coverage, given the great visibility of the work, in accordance with the clients and ANAS, it was agreed to use a green-coloured matrix.

The results obtained are evident and photo 5 highlights the enormous success (given the starting situation) after two months. Unlike the intervention with the geomat, the HYDROMAT® adhered completely to the slope, making it possible to saturate even the most hidden interstices formed with runoff. In this way, it was possible to create total protection at the side of the slope, allowing the seeds to germinate and, later, vegetation to consolidate permanently as we can see after a year in photo 6.

HYDROMAT® H.A.B
Hydraulically Applied Blanket

ROAD SLOPES

PROBLEM - SOIL POOR IN ORGANIC MATTER (INCOHERENT SOIL)

Coarse textured soils are generally unsuitable substrates for vegetative growth due to the absence of organic matter or finer materials that are able to give nutrients to plants. Grassing interventions in such critical geomorphological situations represent an extreme situation characterised by high margins of difficulty due to the purely granular nature of the soil.

Similar problems may also be encountered on sub-vertical slopes with rocky couterscarps, significantly distorted and fractured. This condition of the rocks, very common along mountain roads, causes the instability of entire blocks and debris of various sizes can fall onto the roadway.

CASE HISTORY 1 – BOLZANO S.S. 238

Here, the counterscarp slopes had a high gradient, over 50°, consisting exclusively poorly cemented granular soils (photo 1). The very poor structure of the soil made it logical to perform hydroseeding in two stages: the first aimed at enriching the substrate with nutrients and organic matter through a mixture of humus, seeds and fertiliser; the second adding a layer of **HYDROMAT®** (at least 400g/m²) in order to allow effective protection against the effects of rain and runoff water in the short and medium term.

The result is shown in photo 2, where we can see full recovery of the slope through vegetative growth. Note the absence of complete coverage, impossible to obtain in morphological and geological situations such as those described above, which nevertheless did not represent an inhibitory constraint to controlling the erosive dynamics towards vegetation.

CASE HISTORY 2 - TRENTO STRADA PROVINCIALE FRICCA

Rocky, sub-vertical slopes

For the partial recovery of greenery on the slopes, hydroseeding using the H.A.B. **HYDROMAT®** was carried out. The presence of a matrix of clay and silt between the discontinuities of the blocks of limestone, made it possible to intervene using this solution for re-greening.

Hydroseeding was carried out in two stages: the first aimed exclusively at enriching with organic material and fertiliser mixed with seeds and adhesive to create a suitable substrate. The second seeing the application of **HYDROMAT®** mixed with a further quantity of fertiliser for final hydroseeding fixing. The result can be seen in photo 5 where, as expected, the re-greening is only partial. The effects of hydroseeding are also highlighted by the absence of rocky debris at the base of the slope, as well as the fact that the slope appears considerably different.

It is important to stress the complementarity of the two stabilisation interventions carried out, which saw the presence of mesh and cables for passive defence and hydroseeding with HYDROMAT ®or re-greening and the consolidation of the fine matrix between the discontinuities.

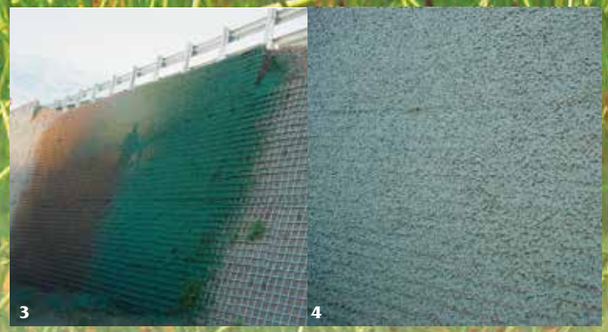

1


2


3 4


5


1


3 4

1st and 2nd stage — Final thickness


2


1. initial situation to be recovered


2. re-greening detail

THICK HYDROSEEDING

REINFORCED SOIL

PROBLEM

The creation of a work with reinforced soil always presupposes grassing in order to consolidate the face against possible erosion and improve the visual impact of the works themselves in the medium and long term. The vegetation element is, therefore, an integral part of the construction system, without which the structure could lose its functionality over time. The main difficulty, however, is represented by the gradient of the slopes to be re-greened, requiring particular care in choosing the appropriate mixture given the especially critical geometric conditions. The presence of topsoil on the back of the face and the use of a suitable end retainer contribute to achieving the best result.

SOLUTION

The suggested technique for re-greening the reinforced soil is thick hydroseeding in two stages (Photos 3 and 4). This because the first stage together with the seed is able to provide a minimum of substrate for the germination of grass while with the application of the second, consisting predominantly of wood fibre mulch in 200 to 250 g/m² quantities, it is possible to provide greater protection against erosion and to create a microclimate that is more favourable for germination.

CASE HISTORY: REINFORCED SOIL ROAD EMBANKMENTS - MONSELICE-MARE (PD)

In this case, re-greening involved working with reinforced soil with the face inclined by about 65° from the horizontal with a biomat made from natural coconut fibres with partially closed interwoven mesh. (Photo 1). The reinforced soil is used to contain a road embankment with the aim of supporting the road, so as to limit the overall lateral dimensions, mitigating the environmental impact. The result, as shown in photographs 2 and 3, was excellent even in the most hidden areas such as the bridge abutments closing off the work.

LANDFILL

VALDARNO (AR): RE-GREENING OF THE CLAY SLOPES OF THE MSW LANDFILL

PROBLEM

Most of the Tuscan Emilian Apennines slopes are composed of cohesive clay soils characterised by poor geotechnical qualities whose natural dynamics very often evolve towards forms of instability and erosion of various kinds. Their re-greening is always a difficult goal to achieve. For the enlargement of the MSW landfill in the municipality of Valdarno (AR) in the Tuscan Appenines, slopes were created whose subaerial exposure to the weather caused the development of erosive phenomena associated with the uncontrolled runoff of rainwater. It was necessary to stop the erosion dynamics through the use of vegetation to re-green the sides.

SOLUTION

The intervention consisted of using thick **hydroseeding carried** out in two stages, the first of which consisted primarily of organic matter to improve the substrate and facilitate seed germination. The photos show the results obtained from a very precarious situation represented by incisions scattered along the whole slope (photo 1). Finally, after a few months from completion of work, we can see dense and homogeneous coverage in its entirety with the full recovery of the slopes (Photo 2).