

Use of Jute Geotextiles in Road Construction

India is a large producer of jute. Jute is a low cost, renewable, biodegradable and eco-friendly natural product. Jute geotextiles are used in many geotechnical applications. A series of field experiments were carried out by CRRI using jute geotextiles for different functions, are described as follows: -

a) Jute Geotextiles as Separator to Improve Pavement Performance

The performance of pavements constructed on soft soils can be improved using jute geotextiles. Jute fabric when used as separator prevents the penetration of subgrade material into voids of granular base course. The permeability characteristic of the fabric also aids in faster dissipation of pore pressures and ensures better drainage which results in better long term performance of the pavement. Provision of fabric enables subgrade develops its full bearing capacity and thus controls rutting. Jute geotextile was used as a separator between subgrade and sub-base layers. Results showed negligible settlements of the pavement after six months under traffic and no signs of surface distress observed in the treated test section.

Properties of jute geotextile used as a separator

Description of Property	Value
Type	Non – Woven
Tensile strength	2.81 kN/m
Thickness	6.91 mm
CBR push through load	0.5 kN
Index puncture resistance	0.077 kN
Inplane permeability	9.2×10^{-4} m/s
Falling cone test	No clear hole formed
Failure strain	30 %

b. Jute Geotextiles for Ground Improvement

The field subsoil was soft silty clay and the water table was 0.5 m below the ground level, the whole area gets submerged during high tide. The highway constructed earlier faced problems of subsidence of the fill during construction, excessive post construction settlements and lateral spreading of fill material, etc. On the basis of settlement calculations, it was estimated that as much as 30 per cent of the fill sinks into the soft subsoil during construction itself, necessitating large quantities of costly fill material, thereby, pushing up the cost of construction. The problem was solved through the use of jute geotextiles. Monitoring of completed embankment i.e. both treated and control stretch showed better performance of road embankment constructed using jute geotextile.



Laying of Jute Geotextiles for ground improvement



Jute geotextile treated section after cyclonic rains

c) Jute Geogrid for Erosion Control of Denuded Slopes

On the basis of field studies, conducted in the past by CRRRI, it has been concluded that shallow sacrificial slides constitute a significant proportion of landslides in areas with moderate rainfall intensity and where soil cover is medium cohesive in nature. Surficial slides extend to only a couple of metres below the slope surface and originate as a result of erosion from down flowing water over the denuded slopes. If erosion is allowed to proceed unchecked, there is every possibility that the damage may spread laterally thus increasing the depth of erosion, eventually resulting in a much larger damaged slope area. Vegetative turfing represents one of the most important corrective measures. In the case of freshly exposed cutting made for road construction, vegetative turfing is important, even as a preventive measure. In the case of deep-seated slides, however, vegetative turfing is only one of the techniques among available corrective measures and as such it can prove to be effective only when conjointly implemented with other corrective measures. Based on several field trials carried out by the Institute, the use of jute geogrid technique has been developed for treatment of erodible slopes as a part of landslide correction works.



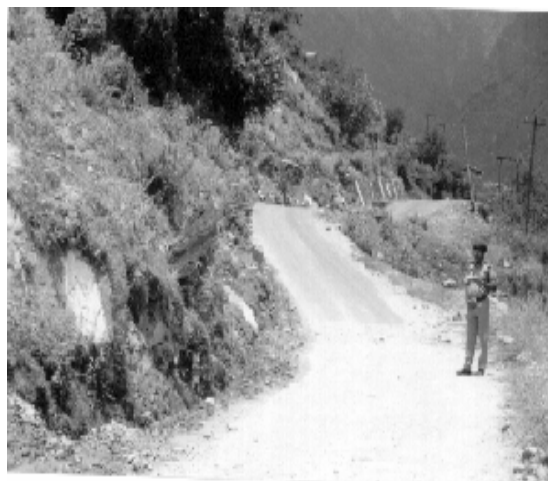
Growth of vegetation on slopes covered with jute geotextiles

d). Jute Geotextile for Drainage and Filtration Application

The field conditions were the stretch of hill road was located on debris slide area and debris consists of micaceous sandy silt. A number of seepage points exist on the uphill as well as on downhill slopes. The road stretch was experiencing subsidence during the monsoon every year, including damages to the restraining structures. Breast walls constructed earlier had been damaged due to slip. To arrest the sinking of road pavement, a systematic network of roadside trench drains and cross trench drains were constructed using non-woven jute geotextiles. The trench drains were made of rubbles encapsulated in non-woven jute geotextiles to stop the finer particle entering into the voids of encapsulated rubbles, thereby preventing clogging the trench drains. About 1000 sq.m of non-woven jute fabric having 750 gsm has been used for drainage application on about 100 m length of road stretch. The monitoring of field experiments on this particular stretch of treated road has shown very encouraging and satisfactory results. There has been no further sinking and subsidence of the road at this location after three years.



***Laying of Jute geotextile
as Trench Drain***



***Condition of road stretch after Monsoon
Rains***

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