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Use of Jute in Road Subgrade

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Abstract:
In recent years jute geotextile used different areas of construction. It is relatively cheap and durable. It increases the bearing capability of soil that used in construction. It can be used in different purposes such as prevention of soil erosion,strengthening road subgrade etc. By using different length of jute fibre in pavement the strength of the subgrade can be increased. CBR value for different position of road has been studied by using different length of moulde of jute. In this review paper we studied about uses of jute to improve the strength of subgrade on road construction with the help of different kind of soil.Black Cotton soil,Murum soil and Mix soil are used to compare CBR value.

Keyward: *jute jeotextile, reinforcement, black cotton soil(BC), subgrade, California Bearing Ratio(CBR)*

I. Introduction:

Geo means earth and textile means fabric . In recent years jute is used in many sector such as road ,port, flyover, drainage etc. Subgrade is the lower layer of asphalt. It takes all the load from the upper layers. The result of using jute shows that it can improve the bearing capacity significantly. Jute increases the ductility of soil. Every type of soil has different CBR value. Value of CBR increases by reinforcing the soil with jute. It is also economical. The Jute Geo-textile strengthens the soil sub-grade by preventing intermixing of sub-grade and sub-base by acting as a separation layer and further it prevents migration of fines of a sub-grade by acting as a filtration materials. By the pilot project taken up under PMGSY, it is found that there is cost saving of about 12% in road construction.[11]CBR value of different types of soil plays the main role to make the subgrade durable.

1.Summary:

1.1 *Objective:*

1.Use of jute in subgrade to improve the strength.

1.2 *Use of jute in road construction:*

As long as jute does not decompose it works as initial layer that can take extra load.[1]Jute geotextile can absorb a lot of moisture from subgrade.[1]The subgrade soil will become more competent through consolidation process.[1]This process enhanced by jute. The four main applications for geo-textile in roads are sub-grade separation and stabilization, base reinforcement, overlay stress absorption, base reinforcement, overlay stress absorption, and overlay reinforcement. Sub-grade stabilization and base reinforcement involve improving the road structure as it is constructed by inserting an appropriate geo-textile layer. Sub-grade separation and stabilization applies geo-textile to both unpaved and paved roads. Geo-textile can be used as interlayer by placing them below or within the overlay. Some geo-textile relieves stress and others are able to reinforce the overlay. The products may also provide a moisture barrier.[5]

The uses of jute in rural roads of Bangladesh is given below:

Table 1: Description of the trial sites for rural road construction (JDPC-BUET, 2013)

Project	Name of Road	Location on BD Map	Facilitating Agency	Chainage (m)	Length (m)	Total Length (m)
RRC	Turag-Rohitpur-Bourvita Road, Keranigonj	North-east	RHD	9+00-9+487	487	4637
	Circular Road, Savar Cantonment, Savar	North-east	LGED and SWO	3500-4500	1000	
	Southpara, Brahmanbaria	East central	LGED	1560-2260	700	
	Tezkhali up-Titas river ghat Road, Brahmanbaria	East central	LGED	00-450	450	
	Noabenki Garazehat Road, Shamnagar, Dist.- Satkhira	South-western	LGED	6600-7600	1000	
	Lahuria Saibor - Mithapur Bazar Road, Lohagora, Narail	South-western	LGED	5000-6000	1000	

Improvement of CBR value by using jute geotextile: In order to study the effect of lateral confining pressure on the CBR value different sizes of moulds are used.CBR values decrease with increase of mould size.(2)

Percentage of increasing the value of CBR with different mould size(dia)				
Position of the JGT from the top	100mm mould	150mm mould	200mm mould	250mm mould
10mm	145.45	130.74	111.59	100.98
20mm	91.59	80.19	66.54	58.12
30mm	75.85	44.44	31.94	25.64
40mm	60.11	31.67	21.50	15.26

Table: Percentage increase in CBR values(2)

In this graph and table we can clearly see that Murum soil shows the high capacity among Black Cotton soil and mix soil.We can specifically show that test sample of murum soil that taken ½ distance of road.Though the percentage of Black cotton and mix soil is higher than murum soil.But value of CBR is much higher for murum soil.If jute used in murum soil and then makes the subgrade,the subgrade will be more durable.

	Percentage increase over original CBR value					
	Jute samle-1			Jute sample-2		
soil type	1/3 part	1/2 part	2/3 part	1/3 part	1/2 part	2/3 part
B.C soil	280	200	170	270	140	120
Murum	155	134	128	147	114	107
Mix soil	274.7	234	214	260	118	161

Table:%Increase of CBR value(3)

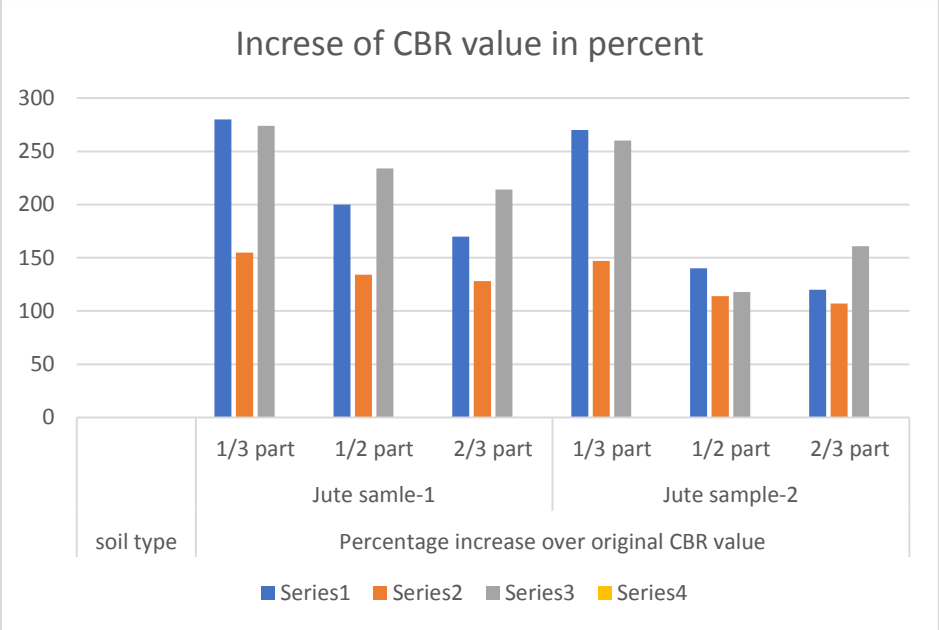

Figure: The trend of CBR by using jute

Finding:
Advantage:
1.Jute reinforced soil is more stable
2.Jute reinforced subgrade can bear more load
3.CBR value increases
4.It reduces pavement thickness
5.It is more eco-friendly than traditional material
Disadvantage:
1.Jute can be decomposed within short time.
2.The subgrade is 30-50% permeable to precipitation water.(5)

II. Conclusion:

A series of tests were taken consideration to investigate the improvement of the strength of subgrade.Jute reinforcement improves the soil properties.Reinforced soil works better than unreinforced soil.It increases CBR value significantly.The effect is significant when the soil has no more fine percent.It also decreases surface penetration and reduce the pavement thickness.It increases durability of road.

There must be difference in load bearing capacity for rural roads and roads in city.Jute reinforced soil used mainly in rural areas.There should be more investigation by using jute reinforced subgrade in the roads of city.

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