

ADDITION OF BANANA PEEL (FIBRES) IN CONSTRUCTION OF ROADS

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Abstract: Banana is the most abundant and consumable fruit in India as well as across the world. The wastage of its peel is also in large scale. The peel of banana is highly fibrous and has considerable strength for which it can be used as reinforcement in different materials. . Due to the increase in the number of heavy transports, flexible pavements seems to be durable. The main objective of this study is using this fibrous material with bitumen and increase the sustainability and strength of flexible roads as well as managing the economic and eco-friendly point of view.

Keywords: Banana, bitumen, pavement strength.

I. INTRODUCTION

Due to increase of population in India, the number of road transport is increasing day by day and so the demand of roads. But the main issue is that the strength, the durability of roads is hindering the swift and smooth movement of vehicles. Cracks, potholes, broken bitumen and many problems are increasing and this should not go unnoticed. Fibers extracted from Banana peels can be solution to these problems. The waste of banana peels will also decrease which will eventually decrease the overall waste produced. Due to its organic nature, banana peels are quite ecofriendly. Banana is an abundant fruit grown throughout the year, so the source of fiber material is quite abundant and it is economic to the country.

Banana peel fibers can possibly increase the strength and performance of bitumen pavement. Banana peels contain 6-9% dry matter of protein and 20-30% fiber (measured as NDF). Banana peels are high in tensile strength, is very lustrous and can sustain heavy loads.

II. LITERATURE REVIEW

Neeraj Kumar Chaubey studied the behavior of polythene in bitumen concrete pavement by marshal stability value and marshal flow value for grade 60/70 and found out that the value of polythene content to be 4% which is optimum.

Marwan Mostafa studied the characteristics of fibers of banana and extraction process of banana fibres and cleaning it in 6% NaOH solution and drying it.

Vishal Gadgihalli investigated the use of peel as admixture and analyzing the contents of the banana fibres.

Heloisa Tibolla explained the possibility of extraction of cellulose Nano-fibers produced from banana peel by two methods – chemical and enzymatic treatment.

Arian H. De Bondt pointed out the problem of reflective cracking due to the impact of heavy loads.

Chikkanagouda Choudhari briefed about the function of fibers that fibers are great stabilizers and are used to decrease the drain down and to increase the strength and stability of stone matrix asphalt mix.

III. OBJECTIVE

The main objective of this study is to increase the strength of bitumen pavement by using banana peel. The extraction of banana peel fibers is to be done by using proper methods and then it's added to the bitumen at a particular temperature so that it doesn't destroy the fibers and then check the strength of the bitumen.

The use of banana peels helps in reducing the waste produced and is a biodegradable product, so it can help in the ecofriendly and economic development of the country.

IV. PROCEDURE

To require the desired property of bitumen before addition of banana peel fiber, aggregates are graded in such a way that they are pass through 12.5 mm sieve and retained in 10mm sieve. Tests are conducted such as marshal stability test, ductility test, water absorption test, specific gravity test.

Marshal Stability Test: This test helps to determine the strength of bitumen and aggregate mix by checking out the deformation in the sample

Ductility Test: It will determine the bonding strength of bitumen and aggregate and workability of bitumen while maintaining the bond between bitumen and aggregate.

Water Absorption & Specific Gravity Test: Water absorption test is used to determine the capacity of aggregates used in bitumen to hold water and specific gravity will determine the quality of the aggregates.

Marshal stability test will be conducted twice, firstly with the addition of banana fibers and secondly without the addition of banana fibers. This will help us determine increase in the strength of bitumen sample that is to be tested.

Banana fibers are treated with alkali solution to clean the fibers and segregate the fibers from the peel and are dried. The fibers are arranged as mesh and form the underlying layer between the bitumen layers.

V. RESULTS

There should be good bonding between the aggregates and bitumen and the workability should increase with increase in the use of banana peel fibers. The strength of bitumen should

increase with addition of banana peel fibers. Improvement in the abrasion property of bitumen due to improved bonding. Fibers will provide great stability and flexibility to bitumen and will decrease the porosity of the bitumen compound in addition will act as an impervious layer to the water drained areas which will lead the camber to drain out the surface water.

VI. CONCLUSION

Probabilistic increase in the strength and ductility of bitumen when there is increase in addition of banana peel fibers. Moreover, can be concluded that peel of banana can be an additive material with cheaper cost to increase the workability of the asphalt mix.

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