PRELIMINARY RESEARCH ON USE OF MNYAA AS ALTERNATIVE ROAD BINDER

ABSTRACT

In June 2011, the Tanzania Commission for Science and Technology (COSTECH) informed the Tanzania National Roads Agency (TANROADS) of an invention of a road construction materials. This invention was: in December, 2008, a premix patch of 1.5m by 1.5m and about 30mm in thickness was constructed on a road with a binder material from milky liquid **Mnyaa tree** in place of bitumen and sandstone aggregates in Kiomboi, Singida Region - Central Tanzania.

The binder material for the premix was a milky liquid extracted from a plant known in many parts of Tanzania as **Mnyaa** described as **Euphorbia Tirucalli**. A preliminary investigation/research was initiated by Central Materials Laboratory (CML) TANROADS and a few tests conducted to the latex material. t is believed that latex from mnyaa traditionally used as glue, medicine and mosquito repellant or poison, contains 75% to 82% resin, and 14% to 15% percent caoutchouc. A resin is a hydrocarbon secretion of many plants, particularly coniferous trees. This plant is included in the list of plants with a potential for biodiesel.

Laboratory tests were conducted following procedures adopted for asphalts. The mnyaa sample was collected from a mature tree for further laboratory tests. Temperature and heating time affects the quality of the latex liquid. In the Lab Flash point of the materials was found at 258^{o}C and fire point at 270^{o}C while the softening point was found to be 64^{o}C. The density of mnyaa, a molten material was found to be 1.086g/cm^{3} . The penetration at 60^{o}C on average was 219 while the viscosities at 85, 95 and 160^{o}C were found to be 126000, 34517and 561 Centipoises respectively. At 60^{o}C viscosity test failed due to the material being too stiff.

Standards cylindrical briquettes of three trial mixes of mnyaa with coral aggregates heated to 140^{o}C were prepared in the laboratory using 4%, 5% and 6% of mnyaa for marshal stability tests at temperatures of 60^{o}C and 40^{o}C. The mashall test indicated the stability at 60^{o}C to increase with increased binder content from 4.4kN, 14.8kN to 17.4kN and the flow decrease from 2.8mm to 2.5mm then increase to 3.4mm at binder contents of 4%, 5% adn6% respectively. At 40^{o}C the marshal stability were about 2.5times higher while the flow were about half way as compared to the values at 60%.

The preliminary research indicated that the un-engineered trial patch constructed lasted in the location for more than three years and is still intact Mnyaa mixes may be evaluated using Marshall tests just like bituminous mixes

Though the trial site and laboratory results are promising the safety on handling the material, long-term behavior , appropriate temperatures for mixing and laying of the mixes; methods of identification and standardization of the material; technologies for extraction, storage conditions, and its chemistry in general need to be further researched.

Further research is still required/planned for more practical and sustainable conclusions.