Research

Dr. Noor Suraya produces EnviRoof for sustainable stormwater management

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PEKAN, 6 October 2022 – Cities continue to grow rapidly as migration from rural to urban areas increases.

This increase indirectly causes various urbanisation or municipal issues to occur.

Green areas have been replaced with rainproof areas such as building construction and roads that have increased rainwater flow.

The less water is absorbed into the soil, the more often flooding occurs and worsens.

The urbanisation process also increases the accumulation of pollutants in the catchment surface area, deteriorating water quality.

Looking at this situation, a lecturer of the Faculty of Civil Engineering Technology (FTKA), Dr. Noor Suraya Romali, 39, has produced Enviroof, a new low-cost green roof product that uses recycled materials such as shell waste and coconut coir as the best research for stormwater management.

The research was conducted in collaboration with FTKA lecturer, Dr. Abdul Syukor Abd Razak, Dr. Khairul Anuar Shahid, Dr. Suryati Sulaiman, postgraduate student Hadhirra Nurdiana Abdul Hamid, and several FTKA undergraduate students, Muhamad Nurfaizal Suzany, Fatin Afiqah Ardzu and Siti Khairena Khamis.

According to Dr. Noor Suraya, the burnt and crushed coconut shell waste has great potential to be used in the drainage layer to enhance the hydrological performance of the green roof which serves to hold rainwater and reduce the runoff peak flow.

UNIVERSITI MALAYSIA PAHANG

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EnviRoof FOR SUSTAINABLE STORMWATER MANAGEMENT

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Patent
- UI20211007115

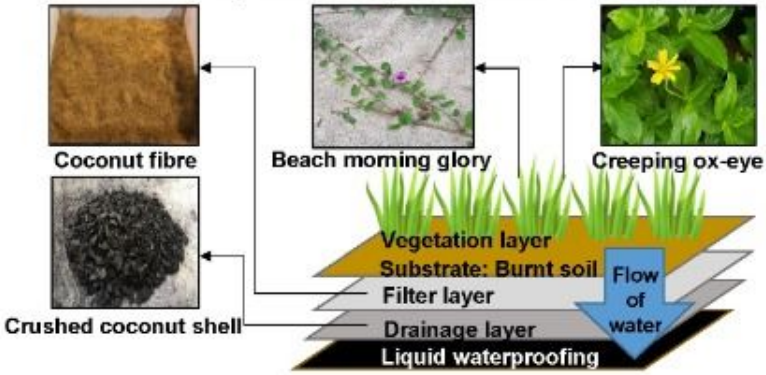
PRODUCT BACKGROUND



EnviRoof is a sustainable stormwater management tool capable to reduce the peak runoff and improve the quality of stormwater.

STATE OF THE ART: The concept of EnviRoof

EnviRoof is a vegetated roof system consist of five layers:



NOVELTY

- Low cost and environmental friendly product.



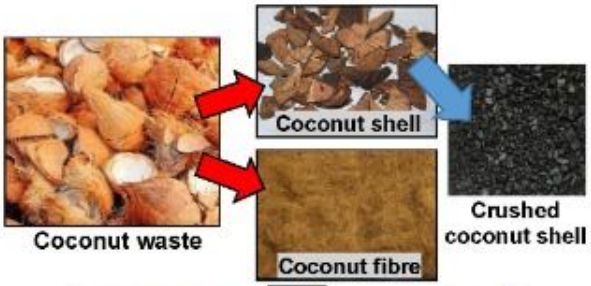
Utilizing recycled waste materials– coconut waste.



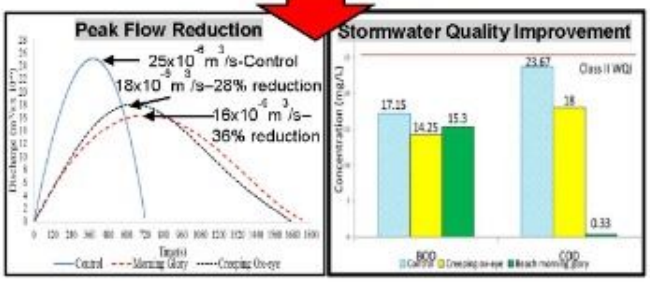
Beach morning glory and creeping ox-eye flowering freely on sandy beach in Malaysia.

- Low maintenance cost.
- Promoting applicability of green roof in Malaysia.

EnviRoof: FROM WASTE TO GREEN PRODUCT







MARKETABILITY & COMMERCIALISATION



94% potential marketability in Malaysia.

GTMP key sector & GBI criteria:



- Requirement of ≥ 50% vegetated roof from the roof area.
- Demand of building product with recycled content (≥10% of project materials)

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BENEFITS & APPLICABILITY

Green, non-polluting product
- Providing an environmental and esthetical value to environment.

Stormwater management tool
- Help in reducing the risk of flood and provide better quality of water for environmental sustainability.

COST ANALYSIS

	Price per m²
Market	*RM400
EnviRoof	RM150

*Source: Abdul Rahman et al. (2013)

STATUS OF INNOVATION

TRL 6 – Prototype system

ACHIEVEMENT/AWARD

GOLD MEDAL, CITREX 2021

ENVIRONMENTAL IMPACT



PUBLICATION:

1. Romali, N. S., Othman, N. S., and Mhd Ramli N. N. (2021). The application of green roof for stormwater quantity and quality improvement. IOP Conf. Ser.: Earth Environ. Sci. 682 012029. (SCOPUS Indexed Proceeding).
2. Romali, N. S., Suzany, M. N., and Shahid, K. A. Green roof for stormwater runoff control. Expected to be published in AIP Proceeding in 2022. (SCOPUS Indexed Proceeding).

INDUSTRIAL COLLABORATOR:

MG Consult consulting engineers

“Enviroof is also important to improve runoff quality and make the environment always look green.

“It is a roof-covered system of plants consisting of five layers.

“The layers are plants (beach morning glory and creeping ox-eye), substrate (burnt soil), filter (coconut coir), drainage (burnt and crushed coconut shells) and waterproofing layer,” she said.

She added that EnviRoof research began in 2020 and is still ongoing.

“Preliminary discussions have begun with the Department of Irrigation and Drainage Malaysia (DID) to further expand the use of the green roof as the Best Management Practice (BMP) for rainwater management in Malaysia.

“Other than that, we are also working on knowledge sharing and technology transfer with a consulting engineering company, MG Consults,” she said.

Dr. Noor Suraya added that the application of green roofs in Malaysia is limited, although it has many benefits.

“One of the reasons for the lack of use of green roofs is the high cost.

“That is why this research aims to produce low-cost green roofs.

“Recycling coconut waste as a green roofing material has been found to reduce costs compared to the green roofing products available in the market today,” she said.

According to her, EnviRoof uses the latest filtration method where the vegetation layer functions to retain water, the substrate layer provides nutrients to the plants, and the coconut coir acts as a filter layer.

“In addition, the role of the drainage layer (burned and crushed coconut shell) is to allow water access and the waterproofing layer is used in the green roof system to avoid leakage.

“This research produces an economical green roof system which is cheaper than the existing system in the market to encourage the implementation of the green roof system in Malaysia.

“In addition, the production of green roofing systems from waste also helps to maintain the sustainability of nature and reduce the dumping of coconut waste in Malaysia,” she said.

She planned to expand the research of this product to a pilot scale, where the system would be installed in selected buildings or residential areas to test its effectiveness.

Before this, she conducted research on waste traps or gross pollutant traps (GPTs) in 2010 to assist in stormwater management and the research won a bronze medal in the BioMalaysia Exhibition 2011.

This product bagged a gold medal in the 2021 Creation, Innovation, Technology & Research Exposition (CITREx).

At the International Invention, Innovation and Technology Exhibition (ITEX) 2021 held at Kuala

Lumpur Convention Centre from 13 to 14 December 2021, this research also bagged a gold medal.

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TAGS / KEYWORDS

EnviRoof

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