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ABSTRAK

Penelitian bertujuan untuk menyelidiki pengaruh termal pada beberapa tanaman terpilih dalam lansekap vertikal. Pengurangan suhu dalam kajian ini dua tipe tanaman di Malang, Indonesia. Pendinginan alami pada beragam tanaman dikaji melalui pengukuran lapangan tehadap penerapannya pada rumah tropis. Uji coba kinerja termal menggunakan dua jenis tanaman sayur. Tanaman sayur yang digunakan adalah tanaman Sawi dan Bayam Merah. Efektifitas penurunanan suhu dipengaruhi oleh jenis tanaman dan jarak lanskape vertikal dengan bangunan. Hasil menunjukkan bahwa tanaman Bayam Merah mempunyai kemampuan menurunkan suhu lebih baik dari pada tanaman Sawi. Secara umum, kedua tanaman mampu menurunkan suhu di daerah tropis. Hasil kajian secara khusus, adalah penurunan suhu secara efektif disebabkan penerapan lanskape vertikal mencapai 6.9°C. Hal ini merupakan salah satu strategi mewujudkan konsep bangunan ramah lingkungan sebagai upaya penghematan energi.

Kata kunci : Lanskape vertikal, pendinginan alami

ABSTRACT

This research aims to investigate the thermal effects to provide reference for plant selection in vertical landscape. Temperature reduction experiments are carried out on two types of plants in Malang, in Indonesia. The passive cooling of various plants was investigated by field measurement in Indonesian tropical houses. Thermal effect experiments were performed on 2 types of vegetables plants. Plants that grew well came from the families amaranthus hybridus and brassica juncea. When temperature reduction effectiveness was measured in regard to plant type and vertical landscape gap. Amaranthus hybridus plants have better temperature reduction than brassica juncea plants. The plants suggested in this study are suitable for regions with hot humid tropical climates. The results from this study

show that plants suitable for vertical landscape that decrease indoor temperature effectively (maximum until 6.9°C) can adequately use realize green building concepts such as ecological friendliness and energy conservation. Keyword: vertical landscape, passive cooling

RINGKASAN

Strategi pendinginan alami merupakan kriteria utama untuk mencapai kenyamanan termal dalam rumah tinggal di Indonesia. Pada iklim panas dan lembab di lingkungan perkotaan, terdapat dua kendala dalam penerapan ventilasi alami, yaitu berkurangnya lahan hijau dalam menurunkan suhu luar bangunan serta kecepatan angin di area perkotaan sangat rendah. Kedua hal tersebut dapat meningkatkan penggunaan penghawaan buatan yang pada akhirnya akan meningkatkan kebutuhan energi. Oleh karena itu kemungkinan penggunaan elemen lansekap vertikal sebagai strategi pendinginan alami dengan memadukan potensi menurunkan suhu luar dalam upaya memasukkan udara dingin (ventilasi alami) kedalam bangunan penting untuk dikaji. Kajian ini merupakan pengembangan penelitian sebelumnya terutama tentang ventilasi dan selubung pintar bangunan oleh Nugroho (2001, 2002, 2003, 2005, 2006,2007 2009, 2010, 2011). Penelitian ini akan melanjutkan penelitian tentang pendinginan alami bangunan dengan mengembangkan lansekap vertikal yang optimum pada lahan rumah yang terbatas untuk mengurangi suhu luar bangunan serta dalam ruang sebagai penyelesaian arsitektur lingkungan dalam iklim panas dan lembab. Penelitian dilakukan secara eksperimen dalam tiga tahun yang terbagi dalam tiga tahapan utama yaitu pengembangan sistem pendinginan alami lansekap vertikal, lansekap horisontal dan lansekap adaptif suhu (otomatisasi). Hasilnya akan diseminarkan di forum internasional, dipublikasikan di jurnal internasional, ditulis sebagai buku ajar, didaftarkan paten HAKI, disosialisasikan kepada masyarakat dalam bentuk penerapan ipteks dan kebijakan publik serta diajukan sebagai bahan kerjasama dengan industri konstruksi dan lembaga luar negeri. Dampak hasil penelitian adalah memunculkan prinsip dan produk desain lansekap pendingin alami bangunan khususnya prototipe lansekap vertikal yang mempunyai pengaruh cukup besar untuk memperbaiki kinerja kenyamanan termal rumah tinggal dan upaya penghematan energi.

SUMARY

Passive cooling strategy is main criterion for achieve themal comfort in Indonesian house. There are two problem for natura ventilation application in hot humid climate urban environment : decrease green area for reduce outdoor temperature and low wind speed. Therefore, the problem can increase the use of active cooling and energy consumtion. However, the possiblity of the use vertical landscape as passive cooling strategy is becoming important research. This research based on previous research, especially about ventilation and smar bulidng envelope by Nugroho (2001, 2002, 2003, 2005, 2006,2007 2009, 2010, 2011). The experiment to develop vertical landscape on limited house garden for indoor and outdoor temperature reduction as tropical passive cooling strategy. These research will do by three years experiments and to devide by three stage : vertical landscape, horizontal landscape and adaptive landscape (otomatization). The result will be publish on international conference, journal, HAKI, public hearing, and international joint research. The impact of outcome research is new principle and prototype of passive cooling for increase thermal comfort and energy conservation.

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