

Investigation and study on roof plants in Zhanjiang

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Abstract. In the paper, ten sites is selected to investigate in Zhanjiang roof greening. Results show that the roof of Zhanjiang is given priority to with simple roof greening. Commonly used there are 75 plant species belong to 46 families and 72 genera. *Bougainvillea spectabilis* Willd., *Hibiscus rosa-sinensis* L., and *Chrysalidocarpus lutescens* has higher application frequency. The growth situation of *Chrysalidocarpus lutescens*, *Wodyetia bifurcate* and *Phoenix loureiroy Kunth* etc. is not grow, So, *Palm* plants are not suitable for application in Zhanjiang roof greening.

Introduction

Roof greening has an important role in improving the ecological environment and beautify the landscape[1]. It could improved storm-water management [2,3], amelioration of the urban “heat-island” effect[4],mitigation of air pollution and CO₂ sequestration[5,6], thermal insulation and energy savings[7,8], increased biodiversity and urban wildlife habitats [9]. Roof greening is one of the measures of construction of ecological city, It could greatly increase the green area, release oxygen and carbon sequestration, reduce the “island effect”[10]. Therefore, the research and development of roof greening work is the content of the many researchers had attached great importance, and roof greening plants selection and configuration is one of the important direction [11]. The ecological environment of roof is great difference to the ground, no matter as light, temperature, humidity, soil, etc have obvious difference. So now can also very few materials suitable for roof greening plants can grow all year round on the roof of the plant is less[12]. To this end, we aimed at the above problems, analysis of Zhanjiang roof plant species and their distribution characteristics of natural growth and explore the mechanism of roof plants adapt to the special environment through to the Zhanjiang roof greening plant species and its ecological and biological characteristics of extensive investigation and research for roof greening plants provide theoretical basis for the selection and configuration.

Methods

Surveys shall be carried out with the sampling type, selected ten sites in Zhanjiang roof greening(table1). Observe and record all grow on plant species of roof greening, quantity, growth condition and ecological and biological characteristics of visible. At the same time, calculate the frequency according to plant occurrences in the sample area.

Table1 The profile of study site

site	greening tree species	growth situation
Sheraton Hotel	<i>Bougainvillea spectabilis</i> Willd.	well grown
	<i>Chrysalidocarpus lutescens</i>	well grown
	<i>Ficus microcarpa cv.GoldenLeaves</i>	not grow

	<i>Hibiscus rosa-sinensis</i> L.	well grown
	<i>Heteropanax fragrans</i> (Roxb.) Seem.	well grown
	<i>Melaleuca bracteata</i>	well grown
	<i>Aglaia odorata</i> Lour.	well grown
	<i>Loropetalum chinense</i> var. <i>rubrum</i>	well grown
	<i>Zebrina pendula</i> Schnizl	well grown
	<i>Brunfelsia latifolia</i> Benth.	well grown
	<i>Rhapis excelsa</i> (Thunb.) Henry ex Rehd	well grown
	<i>Alocasia macrorrhiza</i> (L.) Schott	well grown
	<i>Cyperus alternifolius</i> L.	well grown
	<i>Zanthoxylum beecheyanum</i> 'Odorum'	well grown
King Hall Hotel	<i>Callistemon viminalis</i> (Soland.) Cheel.	well grown
	<i>Nerium indicum</i> Mill.	well grown
	<i>Rhoeo discolor</i> Hance.	well grown
	<i>Schefflera octophylla</i> (Lour.) Harms	well grown
	<i>Roystonea regia</i> (HBK.) O.F. Cook	well grown
	<i>Fagraea ceilanica</i> Thunb.	well grown
	<i>Dimocarpus longan</i> Lour.	well grown
	<i>Dracaena angustifolia</i>	well grown
	<i>Arrhenatherum elatius</i> var. <i>bulbosum</i>	well grown
	<i>Ficus microcarpa</i> cv. <i>GoldenLeaves</i>	well grown
	<i>Ceiba insignis</i>	well grown
	<i>Codiaeum variegatum</i> (L.) A. Juss.	well grown
	<i>Livistona chinensis</i> (Jacq.) R.Br.	well grown
	<i>Heteropanax fragrans</i> (Roxb.) Seem.	well grown
	<i>Aglaia odorata</i> Lour.	well grown
	<i>Psidium guajava</i> Linn..	grow better
	<i>Chrysalidocarpus lutescens</i>	not grow
	<i>Epipremnum aureum</i>	grow better
Haitian bus station	<i>Podocarpus macrophyllus</i>	grow better
	<i>Bougainvillea spectabilis</i> Willd.	well grown
	<i>Jacaranda mimosifolia</i> D. Don	grow better
	<i>Ixora chinensis</i> Lam.	grow better
	<i>Jasminum sambac</i> (L.) Ait.	grow better
	<i>Dracaena angustifolia</i>	grow better
	<i>Amygdalus persica</i> L.	well grown
	<i>Hibiscus rosa-sinensis</i> L.	grow better
	<i>Wodyetia bifurcata</i>	not grow
	<i>Arachnis labrosa</i> (Lindl. ex Paxt.) Rchb. f.	well grown
	<i>Schefflera octophylla</i> (Lour.) Harms	well grown
	<i>Schefflera actinophylla</i> (Endl.) Harms	grow better
	<i>Alocasia macrorrhiza</i> (L.) Schott	grow better
	<i>Arrhenatherum elatius</i> var. <i>bulbosum</i>	well grown
	<i>Phoenix loureiroi</i> Kunth	grow better
	<i>Caryota ochlandra</i> Hance.	not grow
	<i>Radermachera sinica</i> (Hance) Hemsl.	grow better
	<i>Philodenron selloum</i> Koch	grow better
	<i>Arrhenatherum elatius</i> var. <i>bulbosum</i>	grow better
	<i>Nerium indicum</i> Mill.	grow better
	<i>Nephrolepis auriculata</i> (L.) Trimen	well grown
	<i>Rhapis excelsa</i> (Thunb.) Henry ex Rehd	grow better
	<i>Bambusa vulgaris</i> Schrader ex Wendland cv. <i>Vittata</i>	grow better
	<i>Sanchezia speciosa</i> J. Leonard	grow better
	<i>Ficus microcarpa</i> cv. <i>GoldenLeaves</i>	well grown
	<i>Alpinia zerumbet</i> 'Variegata'	not grow
	<i>Monstera deliciosa</i>	grow better
	<i>Cyperus alternifolius</i> L.	grow better

	<i>Plumeria rubra</i> L. cv. <i>Acutifolia</i>	grow better
	<i>Codiaeum variegatum</i> (L.) A. Juss.	not grow
	<i>Dracaena angustifolia</i>	grow better
	<i>Cordyline fruticosa</i> (L.) A. Cheval	not grow
	<i>Cycas revoluta</i> Thunb.	grow better
	<i>Melaleuca bracteata</i>	grow better
	<i>Ixora chinensis</i> Lam.	grow better
	<i>Epipremnum aureum</i>	grow better
	<i>Maranta arundinacea</i> L.	grow better
	<i>Erythrina variegata</i> Linn.	grow better
	<i>Aglaonema modestum</i>	grow better
	<i>Duranta repens</i> cv. <i>variegata</i>	grow better
	<i>Livistona chinensis</i> (Jacq.) R.Br.	grow better
	<i>Livistona chinensis</i> (Jacq.) R.Br.	grow better
	<i>Radermachera sinica</i> (Hance) Hemsl.	well grown
	<i>Chrysalidocarpus lutescens</i>	not grow
	<i>Artocarpus incisa</i> (Thunb.) L.	grow better
	<i>Schefflera octophylla</i> (Lour.) Harms	well grown
	<i>Plumeria rubra</i> L. cv. <i>Acutifolia</i>	not grow
	<i>Codiaeum variegatum</i> (L.) A. Juss.	well grown
	<i>Heteropanax fragrans</i> (Roxb.) Seem.	well grown
	<i>Phoenix loureiroi</i> Kunth	not grow
	<i>Cyperus alternifolius</i> L.	not grow
	<i>Ficus microcarpa</i> L. f. var. <i>crassifolia</i>	well grown
	<i>Aglaia odorata</i> Lour.	grow better
	<i>Altemanthera Ficoidea</i> cv. 'Ruliginosa'	grow better
	<i>Codiaeum variegatum</i> (L.) A. Juss.	grow better
	<i>Dracaena angustifolia</i>	grow better
Xin hai city residence	<i>Arrhenatherum elatius</i> var. <i>bulbosum</i>	grow better
	<i>Cordyline fruticosa</i> (L.) A. Cheval	grow better
	<i>Monstera deliciosa</i>	grow better
	<i>Cordyline terminalis</i> cv. <i>Aichiaka</i>	grow better
	<i>Nephrolepis auriculata</i> (L.) Trimen	grow better
	<i>Syngonium podophyllum</i>	grow better
	<i>Hibiscus rosa-sinensis</i> L.	grow better
	<i>Rhododendron simsii</i> Planch.l	well grown
	<i>Duranta repens</i> cv. <i>Variegata</i>	well grown
	<i>Ficus benjamina</i> L.	grow better
	<i>Raphiolepis indica</i> (L.) Lindl. ex Ker	well grown
	<i>Duranta repens</i> cv. <i>variegata</i>	well grown
	<i>Litsea glutinosa</i> (Lour.) C.B. Rob.	grow better
	<i>Phoenix loureiroi</i> Kunth	grow better
	<i>Sterculia lanceolata</i> Cav.	well grown
	<i>Aspidistra elatior</i> Blume.	grow better
	<i>Bougainvillea spectabilis</i> Willd.	well grown
	<i>Chrysalidocarpus lutescens</i>	well grown
Golden Minneapolis residence	<i>Ficus microcarpa</i> cv. <i>GoldenLeaves</i>	not grow
	<i>Hibiscus rosa-sinensis</i> L.	well grown
	<i>Fagraea ceilanica</i> Thunb.	well grown
	<i>Chrysalidocarpus lutescens</i>	not grow
Jinbi garden residence	<i>Pachira macrocarpa</i> (Cham. et Schlecht.) Walp.	well grown
	<i>Bougainvillea spectabilis</i> Willd.	not grow
	<i>Averrhoa carambola</i> L.	well grown
	<i>Psidium guajava</i> Linn..	well grown
	<i>Lonicera japonica</i>	well grown
Jinwan	<i>Pachira macrocarpa</i> (Cham. et Schlecht.) Walp.	well grown

authority	<i>Bougainvillea spectabilis</i> Willd.	well grown
residence	<i>Hibiscus rosa-sinensis</i> L.	well grown
	<i>Manilkara zapota</i>	well grown
Spring	<i>Bougainvillea spectabilis</i> Willd.	well grown
zhuang residence	<i>Osmanthus</i> sp.	well grown
	<i>Loropetalum chinense</i> var. <i>rubrum</i>	well grown
	<i>Ervatamia divaricata</i> (L.) Burk. cv. <i>Gouyahua</i>	well grown
	<i>Clausena lansium</i> (Lour.) Skeels	well grown
Xinyuan residence	<i>Bougainvillea spectabilis</i> Willd.	well grown
	<i>Manilkara zapota</i>	well grown
	<i>Rosa chinensis</i> Jacq.	well grown
	<i>Opuntia stricta</i> (Haw.) Haw. var. <i>dillenii</i> (Ker-Gawl.) Benson	well grown

Result and analysis

According to the different requirements for roof greening roof ,greening can be divided into simple roof greening and roof greening garden two form [13]. The roof of Zhanjiang is given priority to with simple roof greening. Commonly used there are 75 plant species belong to 46 families and 72 genera(table2). *Bougainvillea spectabilis* Willd., *Hibiscus rosa-sinensis* L., and *Chrysalidocarpus lutescens* has higher application frequency. The growth situation of *Chrysalidocarpus lutescens*, *Wodyetia bifurcate* and *Phoenix loureiroi* Kunth etc. is not grow, So, Palm plants are not suitable for application in Zhanjiang roof greening.

Table 2 Roof greening plant in Zhanjiang

Plants	Family	Genus	frequent
<i>Bougainvillea spectabilis</i> Willd.	Nyctaginaceae	<i>Bougainvillea</i>	7
<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	<i>Hibiscus</i>	6
<i>Chrysalidocarpus lutescens</i>	Palmae	<i>Chrysalidocarpus</i> Wendl	5
<i>Ficus microcarpa</i> cv. <i>GoldenLeaves</i>	Moraceae	<i>Ficus</i>	4
<i>Arrhenatherum elatius</i> var. <i>bulbosum</i>	Gramineae	<i>Arrhenatherum</i>	4
<i>Codiaeum variegatum</i> (L.) A. Juss.	Euphorbiaceae	<i>Codiaeum</i> A.Juss.	3
<i>Schefflera octophylla</i> (Lour.) Harms	Araliaceae	<i>Schefflera</i> J. R. et G. Forst	3
<i>Cyperus alternifolius</i> L.	Cyperaceae	<i>Cyperus</i> Linn.	3
<i>Heteropanax fragrans</i> (Roxb.) Seem.	Araliaceae	<i>Heteropanax</i> Seem.	3
<i>Dracaena angustifolia</i>	<i>Dracaena</i> Vand. ex L.	<i>Dracaena</i>	3
<i>Aglaia odorata</i> Lour.	Meliaceae	<i>Aglaia</i> Lour.	3
<i>Livistona chinensis</i> (Jacq.) R.Br.	Palmae	<i>Livistona</i> R. Br.	3
<i>Radermachera sinica</i> (Hance) Hemsl.	Bignoniaceae	<i>Radermachera</i> Zoll. et <i>Moritzi</i>	2
<i>Phoenix loureiroi</i> Kunth	Arecaceae	<i>Phoenix</i> Linn.	2
<i>Pachira macrocarpa</i> (Cham. et Schlecht.) Walp.	Bombacaceae	<i>Pachira</i>	2
<i>Psidium guajava</i> Linn.	Myrtaceae	<i>Psidium</i> Linn	2
<i>Loropetalum chinense</i> var. <i>rubrum</i>	Hamamelidaceae	<i>Loropetalum</i>	2
<i>Monstera deliciosa</i>	Araceae	<i>Monstera</i>	2
<i>Alocasia macrorrhiza</i> (L.) Schott	Araceae	<i>Alocasia</i>	2
<i>Duranta repens</i> cv. <i>variegata</i>	Verbenaceae	<i>Duranta</i> L.	2
<i>Melaleuca bracteata</i>	Myrtaceae	<i>Melaleuca</i> L.	2
<i>Fagraea ceilanica</i> Thunb.	Loganiaceae	<i>Fagraea</i> Thunb.	2
<i>Plumeria rubra</i> L. cv. <i>Acutifolia</i>	Apocynaceae	<i>Plumeria</i> L.	2
<i>Nerium indicum</i> Mill.	Apocynaceae	<i>Nerium</i>	2
<i>Manilkara zapota</i>	Sapotaceae	<i>Manilkara</i> Adans.	2
<i>Nephrolepis auriculata</i> (L.) Trimen	<i>Nephrolepidacea</i> e	<i>Nephrolepis</i>	2
<i>Cordyline fruticosa</i> (L.) A. Cheval	Agavaceae	<i>Cordyline</i>	2
<i>Rhapis excelsa</i> (Thunb.) Henry ex Rehd	Palmae	<i>Rhapis</i> Linn. f. ex Ait.	2

<i>Ceiba insignis</i>	Bomdacaceae	<i>Ceiba</i> Mill.	1
<i>Litsea glutinosa</i> (Lour.) C.B. Rob.	Lauraceae	<i>Litsea</i>	1
<i>Raphiolepis indica</i> (L.) Lindl. ex Ker	Rosaceae	<i>Raphiolepis</i>	1
<i>Callistemon viminalis</i> (Soland.) Cheel.	Myrtaceae	<i>Callistemon</i> R. Br.	1
<i>Ficus benamina</i> L.	Moraceae	<i>Ficus</i> Linn	1
<i>Philodendron selloum</i> Koch	Araceae	<i>Philodendron</i> Schott	1
<i>Erythrina variegata</i> Linn.	Leguminosae sp.	<i>Erythrina</i>	1
<i>Roystonea regia</i> (HBK.) O.F. Cook	Palmae	<i>Roystonea</i> O. F. Cook	1
<i>Altemanthera ficoidea</i> cv. 'Ruliginosa'	Amaranthaceae	<i>Altemanthera</i> Forsk.	1
<i>Zebrina pendula</i> Schnizl	Commelinaceae	<i>Zebrina</i> Schnizl.	1
<i>Rhododendron simsii</i> Planch.	Ericaceae	<i>Rhododendron</i> L.	1
<i>Ervatamia divaricata</i> (L.) Burk. cv. <i>Gouyahua</i>	Apocynaceae	<i>Ervatamia</i> Sta pf	1
<i>Aglaonema modestum</i>	Araceae	<i>Aglaonema modestum</i>	1
<i>Callistemon rigidus</i> R. Br.	Myrtaceae	<i>Callistemon</i> R. Br.	1
<i>Wodyetia bifurcata</i>	Palmae	<i>Wodyetia bifurcata</i>	1
<i>Zanthoxylum beecheyanum</i> 'Odorum'	Rutaceae	<i>Zanthoxylum</i> L.	1
<i>Osmanthus</i> sp.	Oleaceae	<i>Osmanthus</i> Lour.	1
<i>Syngonium podophyllum</i>	Araceae	<i>Syngonium</i>	1
<i>Alpinia zerumbet</i> 'Variegata	Zingiberaceae	<i>Alpinia</i> L.	1
<i>Bambusa vulgaris</i> Schrader ex Wendland cv. <i>Vittata</i>	Gramineae	<i>Bambusa</i>	1
<i>Clausena lansium</i> (Lour.) Skeels	Rutaceae	<i>Clausena</i> Burm. f.	1
<i>Sterculia lanceolata</i> Cav.	Sterculiaceae	<i>Sterculia</i> Linn.	1
<i>Sanchezia speciosa</i> J. Leonard	Acanthaceae	<i>Sanchezia nobilis</i>	1
<i>Lonicera japonica</i>	Caprifoliaceae	<i>Lonicera</i> Linn	1
<i>Jacaranda mimosifolia</i> D. Don	Bignoniaceae	<i>Jacaranda</i>	1
<i>Cordyline terminalis</i> cv. <i>Aichiaka</i>	Agave americana	<i>Cordyline</i>	1
<i>Ixora chinensis</i> Lam.	Rubiaceae	<i>Ixora</i>	1
<i>Dimocarpus longan</i> Lour.	Sapindaceae	<i>Dimocarpus</i>	1
<i>Podocarpus macrophyllum</i>	Podocarpaceae	<i>Podocarpus</i> L. Hér. ex Persoon	1
<i>Epipremnum aureum</i>	Araceae	<i>Epipremnum</i>	1
<i>Artocarpus incisa</i> (Thunb.) L.	Moraceae	<i>Artocarpus</i> J. R. et G. Forst.	1
<i>Jasminum sambac</i> (L.) Ait.	Oleaceae	<i>Jasminum</i> Linn.	1
<i>Cycas revoluta</i> Thunb.	<i>Cycas revoluta</i>	<i>Cycas</i> Linn.	1
<i>Amygdalus persica</i> L.	Rosaceae	<i>Amygdalus</i> L.	1
<i>Codiaeum variegatum</i> (L.) A. Juss.	Euphorbiaceae	<i>Codiaeum</i> A. Juss	1
<i>Opuntia stricta</i> (Haw.) Haw. var. <i>dillenii</i> (Ker-Gawl.) Benson	Cactaceae	<i>Opuntia</i> Mill.	1
<i>Averrhoa carambola</i> L.	Oxalidaceae	<i>Averrhoa</i>	1
<i>Aspidistra elatior</i> Blume.	Liliaceae	<i>Aspidistra</i> Ker-Gawl	1
<i>Maranta arundinacea</i> L.	Marantaceae	<i>Maranta</i> L.	1
<i>Caryota ochlandra</i> Hance	Palmae	<i>Caryota</i> L	1
<i>Brunfelsia latifolia</i> Benth.	Solanaceae	<i>Brunfelsia</i>	1
<i>Ficus microcarpa</i> L. f. var. <i>crassifolia</i>	Moraceae	<i>Ficus</i>	1
<i>Rosa chinensis</i> Jacq.	Rosaceae	<i>Rosa</i> L.	1
<i>Phoenix canariensis</i>	Palmae	<i>Phoenix</i> Linn.	1
<i>Arachnis labrosa</i> (Lindl. ex Paxt.) Rchb. f.	Orchidaceae	<i>Arachnis</i>	1
<i>Rhoeo discolor</i> Hance.	Commelinaceae	<i>Tradescantia</i>	1
<i>Schefflera actinophylla</i> (Endl.) Harms	Araliaceae	<i>Schefflera</i> J. R. et G. Forst	1

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