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Characteristics of plants in public areas of green open spaces in Padang City, Indonesia

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ABSTRACT

GOR Haji Agus Salim Padang and Imam Bonjol Padang, Indonesia are public Green Open Spaces with ecological, social, cultural, and aesthetic functions. This study aimed to analyze the characteristics of plants found in public areas of green open spaces in Padang. The data analyzed were obtained from surveys and field observations in the green open spaces of GOR Haji Agus Salim Padang and Imam Bonjol Padang. The research results were 299 trees from 13 species in 9 families in GOR Haji Agus Salim Padang, while 22 species from 15 different families in Imam Bonjol Padang. The architectural model found in GOR Haji Agus Salim Padang is dominated by Roux and Rauh architecture which function as guides and shaders. At the same time, Imam Bonjol Padang is dominated by Troll and Corner architecture which also serves as shade and guide.

Keywords: Green Open Space, Tree Architecture, Plants, Public Areas.
Article type: Research Article.

INTRODUCTION

The rapid development of cities causes the need for urban land to increase, indicated by changes in urban land use. Alterations in land use can refer to changes in previous land use or changes in use that guide spatial planning plans (Abolhasani *et al.* 2021; Nassif *et al.* 2023). WG Changes that refer to the last land use are new uses of land that are different from previous ground uses, while alterations that refer to spatial planning plans are new uses of land that are not following what has been passed or stipulated (Naserd 2017). City green open space (GOS) is part of an open space in an urban area filled with plants and vegetation (endemic, introduced) to support the direct or indirect benefits generated by GOS in the city, namely security, comfort, welfare, and beauty of the urban area (Wibowo *et al.* 2017). GOS can be in the form of city parks, green belts, and public cemeteries (Sihite 2012). Law No. 26 of 2007 explains that GOS is an elongated area or pathways and groups, whose use is more relaxed, a place for plants to grow, both those that grow naturally and those that are deliberately planted. As mentioned above, this GOS is divided into two, i.e., public and private ones. Based on the Padang City Regional Regulation No. 3 of 2017 concerning GOS, utilization and management of living natural resources (GOS) is carried out in almost every district or city in Indonesia. Padang City is one of the municipalities that manage and utilize GOS (Iqbal & Jumiati 2019). GOR Haji Agus Salim Padang and Padang Imam Bonjol Padang are public GOS. The former is quite spacious, which can be accessed by all people for various activities such as sightseeing, a place to relax, increase knowledge, rest, and is a recreational sports area at certain times such as saturdays and sunday's morning due to the community's need for recreational sports areas, especially in the downtown area. Imam Bonjol Padang, previously named Plein van Rome (Rome Stadium), is a square and a GOS in the Center of Padang City, West Sumatra. After establishing the GOR Haji Agus Salim Padang Stadium in the 1980s, the government named Imam Bonjol to this field. Since 1995, the Municipal Government of Padang has developed an urban forest as a GOS to improve the quality of the urban environment and a means of community recreation (Dwiyanto 2009). For GOSs

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to be maintained, an effort is needed to reduce the impacts that can be caused, such as planting trees that can reduce noise. There are several recommendations in general for reducing noise through forage, such as planting buffer plants close to the noise source, using densely crowned plants whenever possible, using complete cover through forage (starting from ground level), using tall trees whenever possible, selecting trees that grow evergreen (the leaves do not experience a fall cycle), as well as planting plants close together (Utami 2019). Thus, this study aimed to analyze the characteristics of plants in the public open space area in GOR Haji Agus Salim Padang and Imam Bonjol Padang to maintain GOS in Padang City.

MATERIALS AND METHODS

The study was conducted in the green open space (GOS) area of the GOR Haji Agus Salim Padang and the Imam Bonjol Padang, Padang City, Indonesia. This type of study is descriptive with research methods in the form of surveys and observations of the trees found in green open spaces. We observed the tree architectural models and analyzed all tree species found at the site. The tree species whose architectural models studied are displayed in the research results as an observation table.

RESULTS AND DISCUSSION

The results of plant identification carried out at GOR Haji Agus Salim Padang green space included 13 species from 9 families (Table 1).

Table 1. Types of plants found in Green Open Space GOR Haji Agus Salim Padang.

Number	Plant name	Family	Amount	Function	Architecture
1	*Palyalthia longifolia*/ Glodokan	*Annonaceae*	77	Guiding	Roux
2	*Terminalia catappa*/ Ketapang	*Combretaceae*	4	Shading, Aesthetics	Aubreville
3	*Mimusoph elengi*/ Tanjung	*Sapotaseae*	2	Shading, Aesthetics	Aubreville
4	*Pterocarpus indicus*/ Sage	*Leguminosae*	53	Shading	Troll
5	*Erythrina varlegata*/ Dadaproda	*Leguminosae*	14	Shading	Troll
6	*Delonix regia*/ Flamboyant	*Leguminosae*	5	Guiding	Troll
7	*Samanea saman*/ Trembesi	*Leguminosae*	2	Shading	Troll
8	*Ficus Religiosa*/ Banyan	*Moraceae*	8	Shading	Troll
9	*Filicium decipiens*/ Krey Payung	*Sapindaceae*	3	Shading	Troll
10	*Tectona grandis*/ Teak	*Verbenaceae*	10	Guiding	Troll
11	*Swietenia macrophyla*/ Mahogany	*Meliaceae*	111	Shading, Guiding	Rauh
12	*Cocos nucifera*/ Coconut	*Palmae*	6	Guiding	Corner
13	*Roystonea regia*/ King Palm	*Palmae*	4	Guiding, Aesthetics	Corner

The plant identification results in GOS of Imam Bonjol Padang showed 16 species of trees and six species of ornamental plants from 15 families. The following are the constituent tree species found in the green open space in the Imam Bonjol Padang (Table 2). In the green open space area of Imam Bonjol Padang, there were also six species of ornamental plants that beautify the area. The following types of ornamental plants found in the GOS of Imam Bonjol Padang are presented in Table 3. All types of plants in GOR Haji Agus Salim Padang were plants that the government deliberately plants. The existing tree species could increase the comfort of visitors at GOR Haji Agus Salim Padang because the vegetation makes the GOS atmosphere more relaxed, beautiful and shady. This follows the research results of Rochim & Syahbana (2013) on GOS in Pekalongan that the presence of vegetation in GOS parks was very useful for reducing hot air temperatures and providing coolness that can support community activities.

Table 2. Tree species found in the green open space, Imam Bonjol Padang.

Number	Plant's Name	Familia	Amount	Function	Architecture
1	*Samanea saman*/ Trembesi	Fabaceae	61	Shading	Troll
2	*Pterocarpus indicus*/ Sage	Fabaceae	10	Shading	Troll
3	*Cocos nucifera*/ Coconut	Arecaceae	10	Guiding	Corner
4	*Roystonea regia*/ King Palm	Arecaceae	90	Guiding	Corner
5	*Syzygium oleana*/ Red Shoots	Myrtaceae	5	Aesthetics	Attim
6	*Syzygium malaccense*/ Guava bol	Myrtaceae	4	Aesthetic	Troll
7	*Ficus benjamina*/ Banyan	Moraceae	2	Shading	Rauh
8	*Ficus religiosa*/ Bodhi Tree	Moraceae	4	Shading	Rauh
9	*Polyathialongifolia*/ Glodokan	Annonaceae	2	Guiding	Raux
10	*Annona squamosa*/ Srikaya	Annonaceae	3	Shading	Troll
11	*Swietania mahagoni*/ Mahogany	Meliaceae	9	Shading, Guiding	Rauh
12	*Cupressus papuanus*/ Cemarapua	Cupressaceae	12	Guiding	Rauh
13	*Hura crepitans*/ Wheel Fruit	Euphorbiaceae	6	Shading	Rauh
14	*Terminalia catappa*/ Ketapang	Combretaceae	6	Shading	Aubreville
15	*Mimusops elengi*/ Tanjung	Sapotaceae	4	Shading, Guiding	Stone
16	*Morinda citrifolia*/ Noni	Rubiaceae	3	Shading	Petit

Table 3. Types of ornamental plants found in Imam Bonjol Padang

Number	Plant's Name	Familia	Function
1	*Duranta erecta*/ Tea	Verbenaceae	Aesthetic
2	*Ruellia simplex*/ Purple Trumpet	Acanthaceae	Aesthetic
3	*Tabernaemontana divaricata*/ Mondokaki	Apocynaceae	Aesthetic
4	*Alternanthera brasiliana*/ Ruby Leaf	Amaranthaceae	Aesthetic
5	*Euphorbia tithymaloides*/ sig sag	Euphorbiaceae	Aesthetic
6	*Chamaerops humilis*/ Fan Palm	Arecaceae	Aesthetic

The unique characteristics and functions in the arrangement of plants in the GOR Haji Agus Salim Padang green space should be distinguished between shrubs and plants that are resistant to the sun. Plant growth will affect its size, shape, texture, and color during its growth period (Rochim & Syahbana 2013). So that the selection of plant species in GOS of GOR Haji Agus Salim Padang should be considered both the type, tree structure, and leaves. The value of the beauty of GOS depends on the selection of tree species, and there are criteria for selecting tree species for urban greening (Samsudi 2010). Based on the research results on tree architectural models, there are five tree architectural models from 13 plant species, i.e., Aubreville model, Corner, Rauh, Raux and Troll. In the GOR Haji Agus Salim Padang green space, the three architectural models found were few compared to GOS in Imam Bonjol Padang. The GOS in the Imam Bonjol Padang had 16 tree species and six species from 15 families, exhibiting specific functions, so it is suitable for planting in the GOS area of this paddock. The most common tree species in the GOS of this paddock were from the Arecaceae family, e.g., *Roystonea regia*/ King palm and the Fabaceae family e.g., *Samanea saman*/trembles. At the same time, the highest number of individuals (n = 90) was found in Roystonea regia plants. All types of plants in the GOS of this Padang were deliberately planted by paying attention to the ecological functions of plants. Based on its use, the main functions of the expected vegetation were aesthetic, shading, and ecological. This is important, since plants play an essential role in absorbing air

pollution and rainwater, affecting climate stability. In the Imam Bonjol Padang, trees were found to reduce air pollution, including *Swietania mahagoni* (Marmi 2016; Prasetio *et al.* 2021). There are eight architectural models of tree architecture in Imam Bonjol's GOS, including Troll, Rauh, Raux, Aubreville, Corner, Petit, Attim, and Stone. The architectural models of trees suitable for guiding, shading, and aesthetic, and ecological functions were the Attim, Corner, Troll, Leuwenberg, and Aubreville. Variations in these architectural models will impact the position and role of these trees in the community and the ecosystem as a whole (Wulaningsih 2017; Maulina 2019). The tree architecture commonly found in GOS in Imam Bonjol Padang of the Rauh model found were *Swietania mahagoni*, *Cupressus papuanus*, *Hura crepitans*, *Ficus benjamina*, and *Ficus religiosa*. According to Hasanuddin (2013), with the Rauh and Troll models were those leading to the most minor surface runoff and soil erosion, so these models are the best ones used to support soil conservation. The tree architectural model based on the branching pattern greatly determines the location of the leaves and the canopy of a tree (Fig. 1). A tree with a broad canopy will also have a large biomass, so it will have the potential to absorb more significant carbon (Putri & Wulandari 2015; Ekowati *et al.* 2017). The architectural models of forest trees consist of 23 models for other types of trees and forest plants found as models for forest trees in the tropics. The tree architecture is a genetic abstraction from a plant when it starts its growth. So, it is said that the architecture of a tree is not a pattern of growth, habitus, or forms of a canopy. This architecture results from finishing a growth pattern of apical meristem tissue. A plant size and habitus cannot be used as differentiating factors, since once viewed from the scope or habitus, trees and herbaceous plants can have the same growth result (Nurchayati & Ardiyansyah 2021; Hamdani *et al.* 2022).

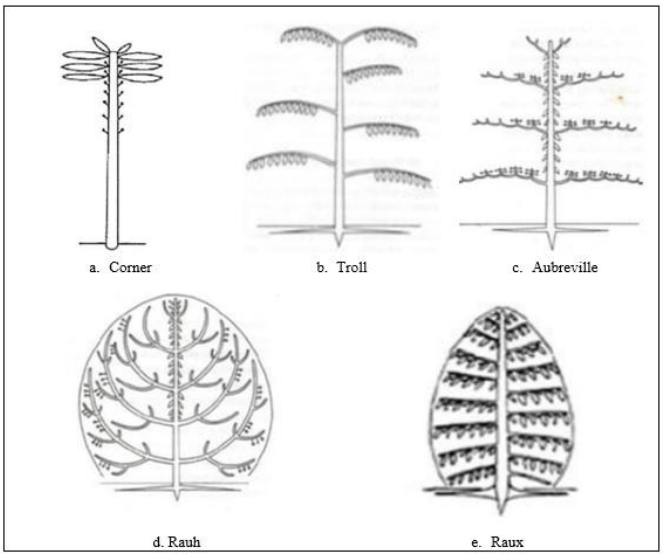

Fig. 1. An example of a tree architectural model.

One of the plants included in the corner model was the palm. This model is characterized by a robust, sturdy trunk 10-30 m in height. The tips of the plants are unbranched and monopodial. Sitting spiral leaf with apical inflorescence. The Troll model has a distinctive feature: the presence of pleiotropically sympodial stems from an early age. The tree flowers as it matures, and the leaves tend to face each other. The formation of upright stems occurs after the leaves start to fall off. Troll's architecture functions as both shading and aesthetic. However, its relatively short height with a widened crown can endanger passing motorists (Leowildi 2015). The Aubreville model is an architectural model characterized by monopodial branching and has rhythmic growth. Each part of the branch grows pleiotropically, and the location of the inflorescence is on the lateral side. The Rauh architectural model is characterized by its components composed of monopodial stems that grow rhythmically. The canopy is shaped like a vase, with a narrow ceiling at the bottom and a wider one at the top. The inflorescence is located laterally. Its rhythmic growth causes this model plant to look like a bouquet. The Raux architectural model is a tree-branching architecture characterized by polyaxial branching stems with different vegetative axes. Branching in all plants is an acro-tonic in forming stems (Manurung & Anwari, n.d.; Nurchayati & Ardiyansyah, 2021).

CONCLUSION

The types of plants found in the GOR Haji Agus Salim Padang were 299 trees from 13 species in 9 families. The characteristics of the plants in the green open spaces (GOS) of GOR Haji Agus Salim Padang can be seen from

the function of the trees as shade, direction, aesthetics, and architectural models of trees, namely Aubreville, Corner, Rauh, Raux, and Troll. The types of plants found in the GOS of Imam Bonjol Padang were 22 species from 15 different families. Based on the plant vegetation, the characteristics of the plants found in the Green GOS of Imam Bonjol Padang are divided into shading, guiding, and aesthetic functions.

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