Identification of Potential Wild Herbal as parts of Landscape Elements

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Abstract. Many landscape plants can grow on their own without cultivated by humans. They are type of plants that can be found anywhere, so they can be categorized as wild plants. The economic value of wild plants are easy to obtain and their maintenance costs are low. Because wild plants not widely known even a just a few of people that aware of their existence, it is necessary to do a study to learn the potential of the wild plants to be used as an element of landscape. This research aims to identify the species that have potential to be used in landscape design, to describe the benefits of the their implementation as a landscape element, and to recommend the wild plants that have functional value and visual. This research used a scoring method based on the functional and visual criteria, and questionnaires were conducted to 50 students of Landscape Architecture IPB who have completed Landscape Plants courses. Based on the research, there are 150 species of wild plants that found in the study site, and 60 of them are recommended as landscape elements. Then all of the species were arranged as a recommendations book so they can be used as alternative landscape plants.

Keywords: functional, alternative landscape plants, wild plants, medicinal plants, visual

1. Introduction

Plants are landscape element that used as functional and aesthetic purposes. Potential plant that can be used as landscape plants, one of them is wild plants. Unfortunately, wild plants has not been used by people, moreover it considered as weed. Besides that, several wild plants has aesthetic value and it easier to maintain than other decorative plants. Therefore, the provision of wild plants as landscape element would be helpful to solve park maintenance problems.

Not all plants has cultivated or planted deliberately, many plants has grown by itself. That kind of plants can be found in many potential places, so that can be categorized as wild plants. Wild plants are indigenous plants or local plants, original plants as introduction plants that developed and known by people in certain areas (Rachman et. al. 2002).

The existence of the plants need to be conserved because of it has economic value and other benefits, such as to be consumed or as pharmaceutical ingredients. Economic benefits of wild plant are easy to find and lower cost to maintain it. Because of wild plants were not widely known yet, moreover only few people are aware of its existence, so necessary to do an study about potential wild plants to be used as landscape elements.

This research objectives are to identify wild plants species that potential to be used in landscape design, to describe other benefits for wild plants owner in its application as landscape elements, and to recommend wild plant species and its design form that can be used in landscape element.
2. Methodology

2.1. Location and time
This research was located in Pos Kesehatan Dusun (Poskedus) Tangkilan, Sidoarum Village, Subdistrict Godean, District Sleman, Special Region of Yogyakarta. This research was conducted in June 2015 until February 2016.

![Research location](image1)

**Figure 1.** Research location

2.2. Research methods
This research consist of five stages, that is: field survey, species identification, presentation and questionnaire, assessment, and recommendation arrangement in gallery book. About 150 wild plant species randomly selected from field survey, then identified by using literature study. Functional quality assessment was conducted by comparing the morphology of each species with four criterias of plant function assessment. That four criterias are architectural function, engineering function, climate amelioration, and aesthetics. Plant morphology that used were: type of plant, plant height, canopy shape, and leaves texture. Visual quality assessment was conducted by presentation and questionnaires to 50 Respondents. Those respondents are Landscape Architecture students (Department of Landscape Architecture, IPB), who has passed Plant in The Landscape course. Respondents were requested to assess visual quality of wild plants based on 150 photos that presented by researcher. The value obtained in questionnaire divided to four criterias, that is form, texture, color, and scale. Visual quality value was obtained with calculating average value of each criteria per species, then it was described in plant description. In recommendation arrangement stage, each of species were given description about functional and visual quality values based on assessment that was obtained, and arranged in an gallery book of landscape plants by using application *File Maker Pro 11*.

2.2.1. Functional quality criterias

Plant function in the landscape consists of architectural function, engineering function, climate amelioration, and aesthetics (Carpenter 1975). The criterias of functional quality assessment presented in Table 1 and Table 2.

| No. | Function | Planting Criteria |
|-----|----------|-------------------|
| 1   | Floor    | • Plants that be used are grasses and ground cover plants |
2. Wall
   - Plants that be used are climber plants, shrubs, bushes, and trees
   - Shrubs/bushes can be used as border plants (>1.25 m)
   - Climber can be places on wire, woods structure, bamboos, or pergola.

3. Divide bigger space to smaller one
   - Plants that can be planted in line that can make a space

4. Circulation
   - Plants that be used are, shrubs, bushes, and trees

5. Corridor
   - Plants that be used are, shrubs, bushes, and trees

6. Connecting space
   - Plants that be used are, shrubs, bushes, and trees

7. Physical Border
   - Plants that be used are, shrubs, bushes, and trees

Screen
1. Screening the bad view
   - Plants that can be used are shrubs and bushes (>1.25 m)
   - Can be planted in high density line, and allowed to be grow higher.

Give the private place
1. Making private place
   - Partial arranged, that is separated but still can be seen (>1.25 m)
   - Full arranged, that is fully separated and can not be seen (>1.25 m)

(Source: Taihuttu 2013)

Table 2 Criteria of other functions

| No. | Functions                                      | Planting Criteria                                                                 |
|-----|-----------------------------------------------|-----------------------------------------------------------------------------------|
| 1   | Erosion control                               | To be as controller erosion by water and air.                                    |
|     |                                               | To be planted so that be cover ground surface                                   |
|     |                                               | Using ground cover plants, climber plants, shrubs, bushes, and trees.            |
| 2   | Noise control                                 | Using shrubs and bushes that planted in several high density line (>1.25 m)     |
| 3   | Sunlight reflector and filter                 | Plants that be used are, shrubs, bushes, and trees                              |
| 4   | Manage traffic in the space room              | Plants that be used are, shrubs, bushes, and trees                              |
|     |                                               | Planted according to desired pattern and arrangement.                           |
| 5   | Setting the accoustic                         | Plants that be used are shrubs and bushes                                        |
|     |                                               | Planted in several high density line                                            |

Climate Amelioration

1. Controlling the sunlight radiation
   - Using ground cover plants, climber plants, shrubs, bushes, and trees.

2. Wind Control
   - Plants as wind barrier, wind breaker, and wind flow control
   - Plants that be used are trees

3. Air filter
   - Plants that be used are shrubs, bushes, and trees
   - Will be effective if the plants are coniferous plants, plants that have wide leaf, or rough surfaced leaf plants.

Aesthetics purposes

1. Two dimensions elements
   - Plant aesthetics can be seen from two dimensions, such as its shadow.
   - Plants that be used are climber plants, shrubs, bushes, and trees

2. Three dimensions elements
   - Can be seen from plant shape, size, colour, and texture.
   - Plants that be used are climber plants, shrubs, bushes, and trees

3. Plant as backdrop, frame, topiary, or espalier
   - Plants that be used are ground cover plants, climber plants, shrubs, bushes, and trees

(Source: Taihuttu 2013)

2.2.2. Functional Quality Assessment. Functional quality assessment was conducted by comparing the morphology of each species with function criterias that have been appropriate. Plant morphology that used were: type of plant, plant height, canopy shape, and leaves texture.
The result of functional quality assessment was as follows: Score 1 (Bad) if <40% of criteria were fulfilled, that means from 22 criterias, only 1-7 criterias were fulfilled. Score 2 (Medium) obtained if 41-60% criteria were fulfilled, that means from 22 criterias, 8-12 criterias were fulfilled. Score 3 (Good) obtained if 61-80% of criteria were fulfilled, that means from 22 criterias, 13-16 criterias were fulfilled. Score 4 (Very good) obtained if >81% of criterias were fulfilled, that means from 22 criterias, 17-22 criterias were fulfilled (Wungkar 2005).

2.2.3. Visual Quality Criteria. The assessment was conducted by spreading the questionnaire to 50 respondents. Visual quality of the wild plant was rated based on four criterias, that is colour, form, texture, and scale. To obtain the total score from each criteria, all score that has been obtained must be summed, then divide to 50. To obtain the total visual quality score, we must be sum the total score of each criteria, then divide to 4 (Figure 2).

\[ \bar{x}_{\text{response criteria}} = \frac{x_1 + x_2 + x_3 + x_4 + \cdots + x_{50}}{50} = \frac{\sum x_n}{n} \]

\[ \bar{x}_{\text{visual}} = \frac{\bar{x}_{\text{colour response}} + \bar{x}_{\text{form response}} + \bar{x}_{\text{texture response}} + \bar{x}_{\text{scale response}}}{4} \]

**Figure 2.** Visual quality assessment formula

3. Result and discussion

3.1. General description

Sidoarum village located 7 KM from west of Sleman and 8 KM from the city of Yogyakarta. Geographical coordinates between 5° 46’ 18” LS - 5° 49’ 16” LS and 110° 17’ 24” E - 110° 19’ 35” E, with UTM coordinates 423 076 425 820 MT and MT-MU 9,138,318 - 9,142,432 MU (Hendriono 2013). Sidoarum village has 8 hamlets, namely Cokro Konteng, Bantulan, Beji, Cokro Bedog, Kramat, Potrowangan, Tangkilan, and Sebaran. Sidoarum village has lower topography with altitude 110 mdpl, temperature 26° C and average of rainfall about 1180 mm/year (Hendriono 2013). The river which is through the village Sidoarum are Kontheng and Bedog River and the upper reaches are in the North of Mount Merapi heading to the South and empties in the Progo River, so that the average of groundwater depth in this village less than 7 meters. Tangkilan located in the Sidoarum village, Godean, Sleman. Total area of Godean is 306.37 Ha. Tangkilan hamlet rich of medicinal plant and the development center known as Pos Kesehatan Dusun (Poskesdus). Poskesdus cultivate more than 501 medicinal plants including wild plants, and they won first prize as a medicinal plant cultivators in provincial level (Hendriono 2013).

3.2. Species identification

Obtained 150 wild plant species identified from the results of field survey in Pos Kesehatan Dusun (Poskesdus) Tangkilan.

Table 3 Species identification

| FAMILY | LOCAL NAME | FAMILY | LOCAL NAME | FAMILY | LOCAL NAME |
|--------|------------|--------|------------|--------|------------|
| Acanthaceae | dluju | Acanthaceae | gempur batu | Acanthaceae | kejbling |
| Acanthaceae | sambiloto | Acanthaceae | jarong lelaki | Acanthaceae | bayam dempo |
| Acanthaceae | daun madu | Acanthaceae | bayam duri | Acanthaceae | kremah |
| Acanthaceae | landep | Acanthaceae | bayam duri | Acanthaceae | gempur batu |
| Acanthaceae | dandang gendis | Acanthaceae | bayam duri | Acanthaceae | kejbling |
| Acanthaceae | gandarusa | Acanthaceae | bayam duri | Acanthaceae | kejbling |

| FAMILY | LOCAL NAME | FAMILY | LOCAL NAME | FAMILY | LOCAL NAME |
|--------|------------|--------|------------|--------|------------|
| Amarantaceae | boroco | Amarantaceae | jenang ayam | Amarantaceae | kaki kuda |
| Amarantaceae | jarong lelaki | Amarantaceae | bayam dempo | Amarantaceae | bunga kenop |
| Amarantaceae | bayam duri | Amarantaceae | bayam duri | Apiaceae | semanggi gunung |
| Apiaceae | semanggi gunung | Apiaceae | semanggi gunung | Apiaceae | semanggi gunung |
| Apiaceae | semanggi gunung | Apiaceae | semanggi gunung | Apiaceae | semanggi gunung |
| FAMILI           | LOCAL NAME   | FAMILI           | LOCAL NAME   | FAMILI           | LOCAL NAME   |
|-----------------|--------------|-----------------|--------------|-----------------|--------------|
| Apocynaceae     | pulosari     | Convolvulaceae  | bangkung     | Nyctaginaceae   | bunga pukul  |
| Apocynaceae     | tapak doro   | Convolvulaceae  | songgo       | Onagraceae      | krangkong    |
| Apocynaceae     | pule pandak  | Crassulaceae    | sosoar       | Oxalidaceae     | krambangan   |
| Apocynaceae     | ginje        | Cyperaceae      | rumput       | Oxalidaceae     | calcing      |
| Aracea          | sente        | Cyperaceae      | jukut        | Passifloraceae  | pernot       |
| Aracea          | keladi warna | Dioscoreaceae   | gadung       | Phytolaccaceae  | getih-getihan|
| Araceae         | talas        | Elaeocarpaceae  | talok        | Piperaceae      | suruhan      |
| Araceae         | sambeng      | Euphorbiaceae   | anting-anting| Piperaceae      | cabe jawa    |
| Araliaceae      | daun mangkox | Euphorbiaceae   | ekor kucing  | Plantaginaceae  | sendokan     |
| Araliaceae      | cikra-eikri  | Euphorbiaceae   | alakifa bintik| Plumbaginaceae  | daun encok   |
| Araliaceae      | poncosudo    | Euphorbiaceae   | buni         | Poaceae         | jali         |
| Asteraceae      | daun seribu  | Euphorbiaceae   | patikan kebo | Poaceae         | sere dapur   |
| Asteraceae      | bandotan     | Euphorbiaceae   | zig-zag      | Poaceae         | jukut        |
| Asteraceae      | purwaceng    | Euphorbiaceae   | cerme        | Poaceae         | jam pang     |
| Asteraceae      | ajaran       | Euphorbiaceae   | daun katu    | Poaceae         | alang-alang  |
| Asteraceae      | daun sembung | Fabaceae        | daun kupu-kupu| Poaceae         | rumput       |
| Asteraceae      | kenikir      | Fabaceae        | secang       | Polygonaceae    | aseman       |
| Asteraceae      | urang-arang  | Fabaceae        | kedinding    | Polyopodiaceae  | simbar        |
| Asteraceae      | tapak liman  | Fabaceae        | kembang telang| Polyopodiaceae  | layangan     |
| Asteraceae      | tempuh wiyang| Fabaceae        | jenu         | Pontederiaceae  | eceng         |
| Asteraceae      | jubung       | Fabaceae        | daun duduk   | Pontederiaceae  | gondok        |
| Asteraceae      | bribil       | Fabaceae        | putri malu   | Portulacaceae   | eceng padi   |
| Asteraceae      | umyung       | Fabaceae        | ketepeng kebo| Portulacaceae   | krokot       |
| Asteraceae      | beluntas     | Fabaceae        | turi         | Portulacaceae   | som jawa      |
| Asteraceae      | wedelia      | Fabaceae        |             | Rosaceae        | gucen        |
| Asteraceae      | stevia       | Fabaceae        |             | Rubiaceae       | remek watu    |
| Asteraceae      | kembang     | Fabaceae        |             | Rubiaceae       | mengkudu     |
| Basellaceae     | binahong     | Fabaceae        |             | Rubiaceae       | nusa indah   |
| Basellaceae     | gendola      | Fabaceae        |             | Rubiaceae       | putih        |
| Bignoniaceae    | bungli       | Fabaceae        |             | Rubiaceae       | rumput mutiara|
| Bixaceae        | kesumba keleng| Fabaceae       |             | Rubiaceae       | daun kentut  |
| Borrugimaceae   | ekor anjing | Fabaceae        |             | Rutaceae        | kemuning     |
| Brassicaceae    | sawi putih  | Fabaceae        |             | Rutaceae        | inggu        |
| Bromeliaceae    | nanas nanasan| Fabaceae       |             | Saururaceae     | amisan       |
| Caictaceae      | duri tengtong| Fabaceae        |             | Schrophulariaceae| jaka tuwa    |
| Campanulaceae   | kitolod      | Fabaceae        |             | Selaginellaceae  | cakar ayam   |
| Cannaceae       | bunga tasbih| Malvaceae       | waru lengis | Solanaceae      | cipulkan     |
| Caprificaceae   | mamang besar| Malvaceae       | sidoguri     | Thymelaeaceae   | makutu dewa  |
| Caprificaceae   | kerak nasi  | Malvaceae       | pulutan      | Urticaceae      | lateng       |
| Combretaceae    | melati belanda| Marantaceae    | bambah      | Verbenaceae     | kembang bugang|
| Combretaceae    | gewor        | Marantaceae     | genrt       | Verbenaceae     | bunga        |
| Combretaceae    | nanas kerang| Melastomataceae | senggani    | Verbenaceae     | pagoda       |
| Convolvulaceae  | songkung air | Menispermaceae  | camau rambat| Verbenaceae     | tembelekan   |
| Convolvulaceae  | bangkung     | Moraceae        | awar-awar    | Verbenaceae     | pecut kuda   |
| Convolvulaceae  | bangkung     | Moraceae        | murbei       | Violaceae       | antanan      |
| Convolvulaceae  | bangkung     | Myrsinaceae     | daun lempeni | Zingiberaceae   | kecombrang   |
3.3. Description of quality plant

3.3.1. Functional quality rating. Plants that have a functional quality with grade 1 (poor) are 17 species, grade 2 (medium) are 5 species, grade 3 (good) are 65 species, and grade 4 (very good) are 63 species (Figure 3). From 150 species, plants which is getting a grade 1 (bad) are types of groundcover, because it only serves as an articulation and aesthetics. While the plants which is getting a grade 4 (very good) are types of shrubs and trees because they fulfill many functions.

Figure 3. Functional quality

3.3.2. Visual quality assessment. Visual quality assessment consists of 4 criteria: color, shape, texture, and scale. Grades obtained based on the results of questionnaires from respondents.

The average value obtained of visual quality assessment criteria of color is 6.3. Wild plant species with a score above the average are 61 species (Figure 4). From the results of the assessment it is known that there are 41% species of wild plants whose color is considered attractive, whereas 59% considered less attractive.

Figure 4. Visual quality of color

The average value obtained of visual quality assessment criteria of form is 6.17. Wild plant species with a score above the average are 78 species (Figure 5). From the results of the assessment it is known that there are 52% species of wild plants whose shape is considered attractive, whereas 48% considered less attractive.

Figure 5. Visual quality of form

The average value obtained of Visual quality assessment criteria of texture is 6.13. Wild plant species with a score above the average are 76 species (Figure 6). From the results of the assessment it is known that there are 51% species of wild plant whose texture is considered attractive, whereas 49% considered less attractive.

Figure 6. Visual quality of texture

The average value obtained of Visual quality assessment criteria of scale is 6.33. Wild plant species with a score above the average are 66 species (Figure 7). From the results of the assessment it is known that there are 44% species of wild plants whose size is considered attractive, whereas 56% considered less attractive.

Figure 7. Visual quality of scale
3.4. Recommendation

The next step is make recommendation based on the results of functional and visual quality assessment by using FileMaker Pro 11 application. The content that provided include: latin name, family, synonym, local name, description of plants (high maximum growth, morphology of the whole body of plants and how to multiply), habitat (open/with shade and grow in lowland/highland), chemical content, description of visual quality and functionally owned and recommendation as an element of the landscape, crop images, as well as additional information (can not be consumed because they are poisonous or can consumed as vegetables and medicines). The following are 60 plant species that recommended as landscape element. Those plant species has functional and visual quality score above the average.

Table 4 Recommendation list

| Local Name   | Func | Vis |
|--------------|------|-----|
| ajeran       | 4(Vg)| 6.58|
| akalifa bintik | 4(Vg)| 7.515|
| alang-alang  | 4(Vg)| 6.405|
| amisan       | 3(G) | 7.22|
| andong       | 4(Vg)| 7.925|
| antanan kembang | 3(G) | 7.63|
| aseman       | 4(Vg)| 7.01|
| bakung       | 3(G) | 6.95|
| bayam dempo  | 3(G) | 6.67|
| boroco       | 3(G) | 6.75|
| bribil       | 3(G)| 7.445|
| bunga kenop  | 3(G)| 7.97|
| bunga pagoda | 4(Vg)| 8.39|
| bunga pukul  | 3(G)| 7.25|
| bunga tasbih | 4(Vg)| 7.905|
| buni         | 4(Vg)| 6.755|
| cakar ayam   | 3(G)| 6.73|
| calincing    | 3(G)| 6.95|
| daun duduk   | 3(G)| 6.865|
| daun encok   | 4(Vg)| 6.925|
| daun katu    | 4(Vg)| 6.575|
| daun kentut  | 4(Vg)| 6.695|
| daun kupu-kupu | 4(Vg)| 6.965|
| daun madu    | 4(Vg)| 7.065|
| daun mangkokan | 4(Vg)| 6.41|
| dljuju       | 4(Vg)| 6.47|
| eceng padi   | 3(G)| 6.445|
| ekor anjing  | 3(G)| 6.41|
| ekor kucing  | 4(Vg)| 6.905|
| gempur batu | 3(G)| 7.005|
| getih-getihan| 4(Vg)| 6.245|
| gewor        | 3(G)| 6.355|
| iler         | 4(Vg)| 7.63|
| jabung       | 3(G)| 6.26|
| jarong lelaki| 3(G)| 6.29|
| jengger ayam | 3(G)| 6.975|
| kangkung alas| 3(G)| 7.225|
| kecombrang   | 4(Vg)| 7.88|
| keladi warna | 3(G)| 6.73|
| kembang bugang | 3(G)| 6.54|
| kembang kertas| 4(Vg)| 6.925|
| kembang telang| 4(Vg)| 7.12|
| kemuning     | 4(Vg)| 6.78|
| kenikir      | 3(G)| 6.68|
| kerak nasi   | 4(Vg)| 7.73|
| mamang besar | 4(Vg)| 6.835|
| melati belanda| 4(Vg)| 7.725|
| nanas-nanasan| 3(G)| 6.845|
| pule pandak  | 3(G)| 7.018|
| putri malu   | 3(G)| 6.58|
| secang       | 3(G)| 6.655|
| sente        | 3(G)| 6.51|
| songgo langit| 3(G)| 6.97|
| suruhan      | 3(G)| 6.93|
| talok        | 4(Vg)| 6.69|
| tapak doro putih | 3(G)| 6.995|
| tembelekan   | 4(Vg)| 6.925|
| turi         | 3(G)| 7.235|
| wedelia      | 4(Vg)| 7.61|
| zig-zag      | 3(G)| 6.705|

4. Conclusions and suggestions

4.1. Conclusion

There are 150 wild plants identified in Pos Kesehatan Dusun (Poskesdus) Tangkilan, Sidoarum Village, Godean, Sleman, Yogyakarta. Consisting of ground cover types of plants, bushes, shrubs, and trees. Each species is described by latin name, family, synonym, local name, morphology, habitat, chemical content, visual and functional quality value obtained, on the landscape, crop images, and additional information fit the category. Additional information consists of non-herbal food crops that can or can not be consumed, as well as herbal food crops that can be consumed or can not be consumed. Wild plants that have functional value and visual quality above average are 60 species, so it can be recommended as an element of the landscape. The recommendations compiled in book form gallery landscape plants using FileMaker Pro 11 application.

4.2. Suggestion

The results of this study can be input and consideration for the designers and managers in designing minimal management of park.
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