GREEN WALL GUIDE

COOLING YOUR HOME WITH THE USE OF LOCAL FLORA

THE MODEL

INDEX

1. INTRODUCTION

This guide was created for implementing cheap and effective green walls on residential buildings, however, this guide can also be used on other buildings. The green wall detailed in this guide was created with the intention of **reducing** the **cost of energy** required for **cooling** in buildings while supporting local plant **biodiversity**. This guide was created specifically for the island of Barbados as the plants listed here are relevant to the island. However, these plants can be substituted for others given the right properties explained in the plant guide.

The model outlined is primarily meant for **smaller buildings**, is extremely **cheap**, and can be done by anyone with very **accessible** materials. Note that alternate green wall models can be made for larger buildings using pre-made wall pots, using the same plants outlined in this guide.

[Insert survey info relevant to BBD]

Before we begin designing the green wall, here's a quick rundown on why you should install a green wall!

Cooling

- In short, the plants convert the energy of the sun into changing the state of water, rather than heating up your walls. This means your house stays much cooler all day long!

Improving air quality

- Plants take up Carbon-Dioxide from the air and turn it into Oxygen that we can breathe!
- Some plants have special air purifying qualities that take out certain harmful chemicals in the air!

Supporting plant biodiversity

- Using local plant species on your green wall is a great way to support your local plant biodiversity and ecosystem!
- Using local plants on your green wall requires much less maintenance since these plants are already accustomed to growing in local climate conditions.

Aesthetically pleasing

- Who doesn't like seeing beautiful plants instead of a plain wall?

Rainwater Management

-Green walls have the capacity to store some of the water that falls on them, meaning you'll experience less flooding around your house!

2. MATERIALS

- [ ] Empty 2-litre bottles (can be various shapes and sizes)
- [ ] Bottle caps (as many as there are bottles)
- [ ] Fishing line or rope or wire (any kind of strong string used for securing the bottles to the structure)
- [ ] Structure to secure the bottles to
- [ ] A fence structure was used in the design outlined in this guide. Alternate structures can be used
- [ ] Something to cut bottles and line with (exacto-knife, scissors, etc.)
- [ ] Sharpie or marker to draw on bottles
- [ ] Soil (soil is dependant on plants, discussed in the plant guide)
- [ ] Garden tools for replanting and scooping soil
- [ ] Plants

3. INSTRUCTIONS

I. Structure Set-Up

1. Set up your structure to attach the green wall to

- In this design, a fence was used to prop up against the existing wall
- An alternate design can be to drill several wooden planks into the existing wall.

II. Preparing the Bottles

2. Calculate how many bottles you will need to fill up the wallspace you want.

- Each bottle is approximately 10cm long and 7cm wide
- So take the width of your wall and divide it by the width of the bottles to determine how many bottles you will need length-wise
- Then take the height of your wall and divide it by the height of the bottles to determine how many bottles you will need height-wise
- Amount of bottles needed = number of bottles width-wise x number of bottles height-wise

3. Cut-out the bottles

There are 3 types of bottles needed for the wall:

a) Bottles for water capture at the top of each column (x1 per column)

b) Bottles holding the plants

c) Bottles at the bottom of the columns used for water drainage (x approximately 1 per 3 columns, depending on the length of the bottle)

a) Cut the bottoms of the bottles off around 6cm from the bottom or however long works for your set up

b) Cut a hole for the plants starting about 8cm from the cap of the bottle

i. Begin by cutting the hole for the plants

ii. Then cut off the bottom of the bottle

c) Cut the bottles in half lengthwise

4. Drilling holes in the bottles

For bottle type a.: mark two dots (a bit higher than halfway up the bottle) where you will drill holes to secure the bottle at the top of the column

- Drill through the bottle at the two markers

For bottle type b.: place the bottle on the wall and mark 2 holes on the bottle where you will drill through to secure it to the wall.

-Drill through the bottle at the two markers

For bottle type c.: place the bottle on the wall and mark 2 holes on the bottle where you will drill through to secure it to the wall.

-Drill through the bottle at the two markers

5. Start drilling holes in the middle of the bottle caps
   - After you've made a hole through the caps, you can put them back on bottles a. and b.

6. Place a wire through the two holes in all the bottles and thread the wire through the structure and tie it tight on the other side to secure the bottle to the structure.

III.Repeat

- Repeat steps 3 to 6 until your wall is fully covered

4. PLANT GUIDE

It's finally time to choose the plants you're going to put on your green wall! The main intent of this green wall is to cool, therefore you're going to want plants that cover every last inch of your wall! The plants best suited for green walls are **vines** that are **drought resistant**, **grow quickly**, are suitable to the **local climate**, native to the area, and have **aesthetic** appeal. Other plants such as succulents can be used on a green wall as well but require monitoring to ensure they are growing properly in the bottles. The plants listed in this guide have one or several of the properties that make them suitable for green walls. These plants were specifically chosen for use in Barbados, however, plants with the appropriate properties can be used in other locations around the world.

Description of plant

Image

Coralita - *Antigonon leptopus*

- Very fast growing plant
- Produces large clusters of pink flowers and often cultivated as an ornamental.
- Climbing plant that supports itself by with tendrils
- Thrives in sunlight
- Tolerates drought by defoliation and regrows strongly after rain
- Roots can be cooked and eaten, the leaves and flowers can be cooked and served with vermicelli

Soil type: Fertile, well drained soil

Source:
http://tropical.theferns.info/viewtropical.php?id=Antigonon+leptopus

Source:
https://paragustossoncolores.blogspot.com/2013/05/paraguayita-antigonon-leptopus.html

Ink vine - *Passiflora suberosa*

- Perennial climbing plant producing stems that can become more or less woody
- Stems can be up to 6 metres long, scrambling over the ground and climbing into the surrounding vegetation, where they attach themselves by means of tendrils.
- A slender vine, the stem does not exceed 2cm in diameter- Lives in: moist or dry, often rocky, mixed or oak forest and thickets, at elevations of 1,000-2,000 metres

Description of plant	Image
- Natural weed in grassland, shrubland, open dry forest, roadsides and disturbed shady localities, at elevations from sea-level to 2,500 metres - Can tolerate moderate amounts of salt wind without injury. - Established plants are very drought tolerant. - Multiple medicinal properties: treating itch, indigestion, treat hysteria etc... *Soil type:* Moist, well-drained sandy or limestone soils, with or without humusy top layer. Prefers soils with organic content, but will still grow reasonably well in nutrient poor soils. Source: http://tropical.theferns.info/viewtropical.php?id=Passiflora+suberosa	Source: https://www.butterflyworld.com/product/passiflora-suberosa/
Scarlet Ipomoea - *Ipomoea hederifolia* - Grows on fence or trellis - Vine can tolerate full sunlight - Can tolerate very dry conditions *Soil type:* Standard potting soil Source: Ipomoea-hederifolia	 Source: http://senthuherbals.blogspot.com/2014/11/ipomoea-hederifolia-kanavalikkodi.html

Description of plant	Image
Evolvulus nummularius - Creeping perennial herb - Weed - Medicinal properties: leprosy, epilepsy, cramps, paralysis etc.. *Soil type:* Standard potting soil Source: https://herbpathy.com/Uses-and-Benefits-of-Evolvulus-Nummularius-Cid5662	 Source: http://ppt218.pixnet.net/blog/post/32116604-evolvulus-nummularius-%28linnaeus%29-linnaeus-短梗土丁桂
Ipomoea obscura - Annual or perennial herb with thin, twining or prostrate stems up to 3 metres long and 2cm in diameter - Lives in: Grassland, thickets, hedges, open forest, waste ground, roadsides and as a weed in cultivated fields, sometimes at sandy beaches, at elevations from sea-level up to 1,800 metres - Grows best in full sun - Medicinal properties: - Attractive flower *Soil type:* Thrives in well-drained soils Source: http://tropical.theferns.info/viewtropical.php?id=Ipomoea+obscura	 Source: http://hihort.blogspot.com/2012/11/not-as-bad-as-bindweed-but-almost.html

Description of plant

Image

Wild cucumber - *Coccinia grandis*

- Perennial, herbaceous vine that can grow between 9 and 28 m long.
- Fast growing
- Used in cooking
- Medicinal properties: analgesic, antipyretic, anti-inflammatory, antimicrobial, antiulcer, antidiabetic, antioxidant, hypoglycemic, hepatoprotective, antimalarial, antidyslipidemic, anticancer, antitussive mutagenic

Soil type: Standard potting soil

Source:
https://www.cabi.org/isc/datasheet/14659

Source:
https://en.hortipedia.com/wiki/Coccinia_grandis

Seaside purslane - *Sesuvium portulacastrum*

- Harvested from the wild in many countries of the world and eaten as a vegetable. It is sometimes sold in local markets.
- Grown as an ornamental and as a ground cover to prevent erosion in dune vegetation
- Grows very well in local climate and is very resilient to replanting and harsh conditions

Soil type: Standard potting soil

Source:
http://tropical.theferns.info/viewtropical.php?id=Sesuvium+portulacastru

Source:
http://hihort.blogspot.com/2012/11/not-as-bad-as-bindweed-but-almost.html

Description of plant

Image

Brahmi - *Bacopa Monnieri*

- Branched, creeping herb, sending out stems 5 - 40cm long, and rooting at the nodes
- Habitat is moist and wet places, such as the borders of water channels, wells etc.
- The leaves can be eaten raw in mixed salads, or cooked as a vegetable, added to soups or pickled
- Has a range of medicinal use.

Soil type: Standard potting soil

Source:
https://www.gardeningknowhow.com/edible/herbs/bacopa-plants/brahmi-plant-care-and-uses.htm

Source:
https://shop.tranceplants.net/products/bacopa-monnieri-brahmi-pure-extract-powder-20-bacosides

Chamaesyce hirta

- Common weed of disturbed sites, waste areas, roadsides, gardens, footpaths, lawns, bare areas, crops and pastures.
- Can invade natural vegetationLatex sap used to remove warts
- Tea is treatment for asthma,reducing fever and promote urination.

Soil type: Standard potting soil

Sources:
https://keyserver.lucidcentral.org/weeds/data/media/Html/chamaesyce_hirta.htm and *Wild Plants of Barbados* by Sean Carrignton

Source:
https://commons.wikimedia.org/wiki/File:Chamaesyce_hirta_%281367413654%29.jpg

5. MAINTENANCE

This green wall was designed to be fairly **low maintenance**.

- The bottlecap holes may get clogged
  - -Simply try and remove the blockage by poking through the hole with a pencil or something the same size
- When the drainage bottles become full, simply remove them and pour them back into the top bottles to reuse the water.
- Check on the plants once a week or less just to see how they are holding up

CREDITS

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