

## **IAQ Award Documents – Attachment 1 – Summary for publication**

### **Name of the project:**

Converting trash to treasure: horticultural waste biochar as a peat replacement for crop growth

**Name of the company/organization hosting the project:** Gardens by the Bay (“GB”)

**Essence of the project:** The goal of this project was to explore locally produced, sustainable alternatives that could replace imported peat in potting media for in-house plant production for displays in GB.

**Problem statement:** Globally, peat is the preferred horticultural potting medium and our in-house plant production for displays is completely dependent on peat, a non-renewable resource, for potting media.

Singapore does not have its own peat sources. Peat is harvested overseas, mostly from peatlands in Europe. Peat harvesting is increasingly under legislative and consumer pressure, as peatlands are the world’s largest carbon sink, so driving research to find more sustainable alternatives.

### **Steps taken, methods used, analysis performed, etc.:**

This utilized the *Kaizen* methodology and the 5-step GB Innovation Process, in collaboration with academic and governmental partners, to identify more sustainable local alternatives to peat. Wood waste from GB was fed into an onsite micro-gasifier, to produce hot water and the biochar used to test the growth of crops grown in biochar/peat mixtures ranging from 10-50% biochar. The fresh and dry weights of crops grown in the biochar/peat mixes were compared with those of plants grown in pure peat to determine the relative yield improvement.

### **Resources used:**

Resources used in this project included: the time and expertise of multiple staff, a climate-controlled glasshouse, laboratory facilities, locally produced biochar from a Terragon Micro Auto Gasification System, MAGS™, peat, seeds, and fertilizer.

### **Results achieved:**

Xiao bai cai and lettuce grown in substrates with 20–30% locally produced gasification biochar had comparable if not significantly higher yields than control plants grown in 100% peat. These results support the use of biochar as a partial alternative to peat and a potential new sustainable circular economy model in Singapore based on the co-generation of biochar and renewable energy from locally derived horticultural waste feedstock and the use of that biochar as a soil amendment and partial peat replacement.

### **UN Sustainable Development Goal(s) affected:**

GOAL 2: Zero Hunger

GOAL 7: Affordable and Clean Energy

GOAL 8: Decent Work and Economic Growth

GOAL 9: Industry, Innovation and Infrastructure

GOAL 11: Sustainable Cities and Communities

GOAL 12: Responsible Consumption and Production

GOAL 13: Climate Action

GOAL 17: Partnerships to achieve the Goal

**An appropriate image that reflects the project and the results:**

