

## Supplementary figures

**Supplementary Figure 1** Gardner Colour Scale.

**Supplementary Figure 2.** Correlation of Agarwood Color Intensity.

**Supplementary Figure 3.** Image of ColorChecker Passport.

**Supplementary Figure 4.** Optimisation of *Chlamydomonas reinhardtii* metabolism for heterologous sesquiterpene production.

**Supplementary Figure 5.** Growth assessment of engineered *Chlamydomonas reinhardtii* engineered strains.

**Supplementary Figure 6.** Calibration curves of sesquiterpenoid standards.

**Supplementary Figure 7.** Correlation matrix heatmap of agarwood samples.

## Supplementary tables

**Supplementary Table 1.** Agarwood samples description.

**Supplementary Table 2.** STPs identified across agarwood (bakhour) samples using GCxGC–TOF/MS.

**Supplementary Table 3.** STPs identified across agarwood distillates (Oudh) samples using GCxGC–TOF/MS.

**Supplementary Table 4.** Terpenoid standard mixture analysed using GCxGC–TOF/MS.

**Supplementary Table 5.** *Chlamydomonas reinhardtii* metabolism optimisation to produce heterologous STPs.

**Supplementary Table 6.** List of plasmids.

**Supplementary Table 7.** Sesquiterpenoid quantification (single transformation).

**Supplementary Table 8.** Sesquiterpenoid quantification (double transformation).

**Supplementary Table 9.** Summary of STP quantification.

**Supplementary Table 10.** Concentrated algal-produced STPs identified in ethanol using GCxGC–TOF/MS.

**Supplementary Table 11.** Sesquiterpenoids identified after hydroboration-oxidation reaction using GCxGC–TOF/MS.

**Supplementary Table 12.** Common sesquiterpenoids identified using GCxGC–TOF/MS in alga-derivate mixture, agarwood, and agarwood distillate samples.

**Supplementary Table 13.** Mass spectra of sesquiterpenoids identified by GC – MS.

## Supplementary files

Files can be downloaded in the following link:

[https://datadryad.org/stash/share/ISU89kHS9Poefgh9g65\\_v6Koerab9ZoBaYyGCclri98](https://datadryad.org/stash/share/ISU89kHS9Poefgh9g65_v6Koerab9ZoBaYyGCclri98)

**Supplementary File 1.** GCxGC–TOF/MS data report of agarwood samples.

**Supplementary File 2.** GCxGC–TOF/MS raw data of agarwood samples.

**Supplementary File 3.** GC–TOF/MS raw data of agarwood samples.

**Supplementary File 4.** GC–MS/FID raw data of engineered algae strains.

**Supplementary File 5.** Genetic constructs.