

# Monitoring of air quality and indoor environment in rooms occupied by houseplants

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Conduct a preliminary study to monitor the influence of plant species on indoor air quality to establish guidelines for the design of a more in-depth future experiment to quantify the potential for indoor pollutant reduction through plants.

rucción Eduardo Torroja-IETcc (Cons

### 2 Method







#### Main activity

Monitor the Indoor Environmental Quality of two rooms by recording comfort conditions and air quality (concentration of CO2, formaldehyde and Volatile Organic Compounds) considering the inclusion of plants in the interior space as the only variable.

### Specific activities

- Determine the initial conditions of both rooms in terms of temperature and CO2. Evaluate the effect in terms of CO2 and temperature by adding a group of plants inside one of the
- Study the individual behavior of the plant species included, analyzing their impact on the
- presence of CO2, formaldehyde and VOCs Monitor pollutants (VOCs and formaldehydes) through passive tubes.

#### Monitoring periods

Stage	Period	Plants	Irrigation	Ventilation
1 Equality determination	29/06(19:00) - 06/07(17:00) / 2020	No	No	No
2 Plants presence	23/07(00:00) - 05/08 (19:00) / 2020	In PR-01	1	Both rooms
3 Species analysis	18/11(12:00) -23/12 (13:00) / 2020	In PR-01	4	Both rooms

#### Type of plants

ncoviorio

Poto



Spathiphyllum Ficus Benjamina Figure 2: Vegetable species included in the study

Kentia

my building is green



Figure 3. Placement of plants in PR-01 during stage 2.



or: <u>martin-cons</u>ı

Acceptable equality under preliminary conditions of temperature and CO2. A possible relationship between the increase in temperature and the increase in po Iluta detected.

- A large number of plants in a room increases CO2 at night, while with a small number of plants the VOCs are considerably reduced. Ficus benjamina and Poto have the greatest capacity to reduce CO<sub>2</sub> within the room of the species
- used and Spathiphyllum had the lowest performance in improving air quality with a low CO2 and formaldehyde reduction.



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Figure 4. Analysis of the influence of the presence of plants in temperature, humidity and CO<sub>2</sub> concentration in the rooms during stage 2



Figure 5. CO<sub>2</sub> and temperature analysis by plant species (Stage 3)



Figure 6.- VOCs and formaldehydes presence analysis by plant species

### 4 Conclusions

#### Tests to implement

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- Tests with stable temperature conditions using active climate control
- systems Study the ideal balance between the number of plants, the increase of co2 and the reduction of VOCS.
- Include the leaf area index and stomatal resistance in the characteristics of the plants under study
- Investigate new variables by testing with low, medium, and high density of plants and in different seasonal conditions. Test with a continuous monitoring of VOCs with injections of controlled
- contamination in both rooms. Include the Blow door test.

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